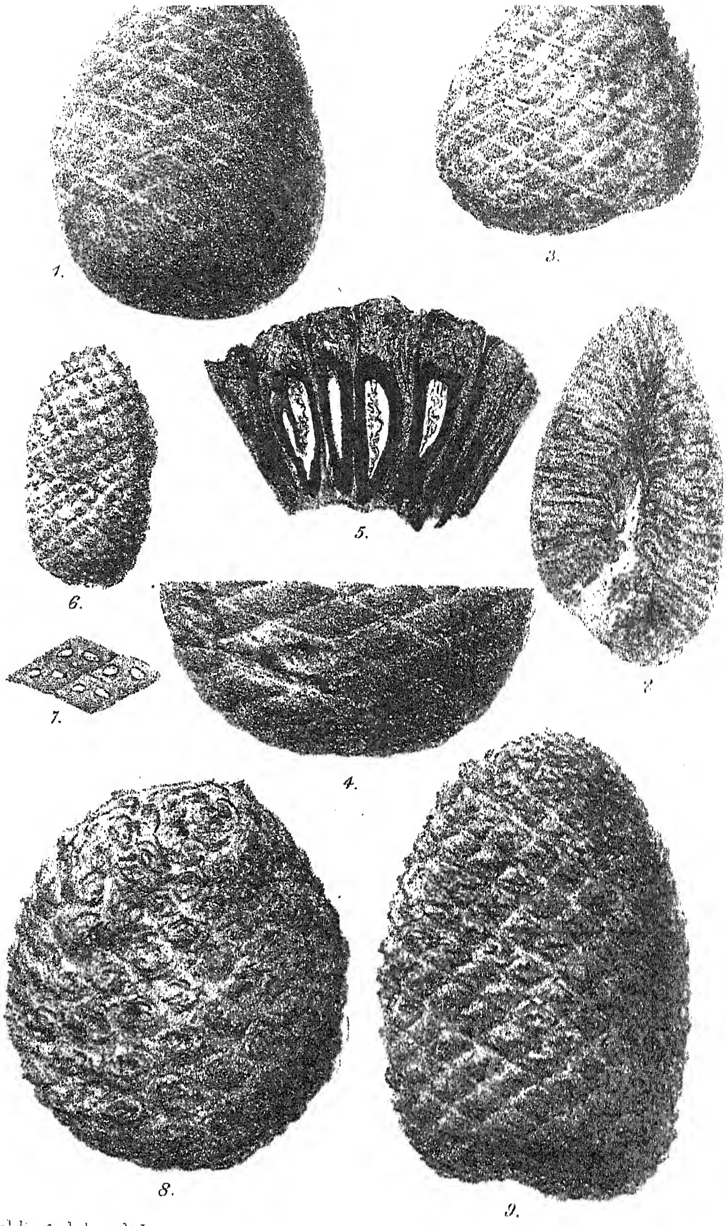

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THE

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BRITISH AND FOREIGN.

EDITED BY

BERTHOLD SEEMANN, PH.D., F.L.S.,

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"Nunquam otiosus."

VOLUME V.

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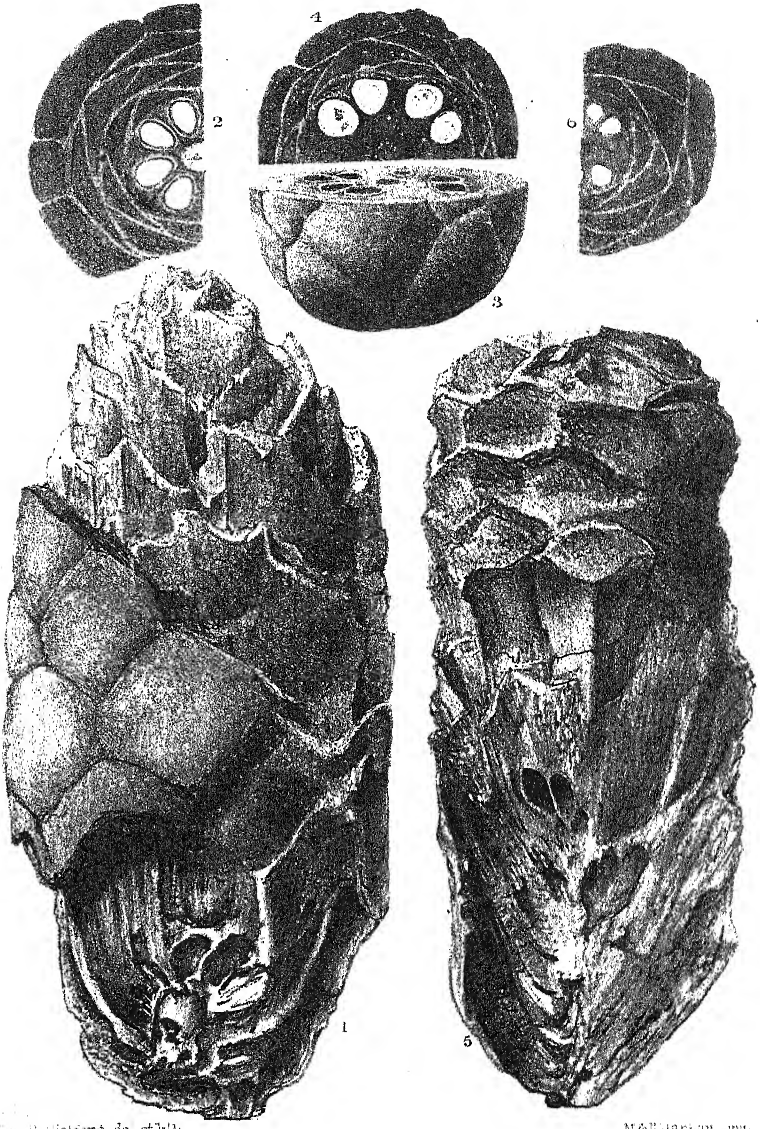
ERRATA.

Page 7, line 9, *delete* "without locality;" ditto, line 10, *delete* "probably;" ditto, line 28, read "C. sphæricus" for "C. sphærica;" line 33, read "C. primævus" for "C. primæva;" p. 264, line 11 from below, read "Quechue" for "Quechne;" p. 265, line 23 from above, read "dulce" for "dulca;" p. 267, line 10 from above, read "Rábano" for "Rúbano;" p. 268, line 12 from above, read "D. toriloides" for "D. torriloides;" ditto, line 32 from above, read "J. Acosta" for "T. Acosta;" ditto, line 37 from above, read "tanto" for "tante;" p. 271, line 34 from above, read "Riñon" for "Rinon;" p. 273, line 25 from above, read "Merey" for "Mercy," and "Pauji" for "Tauhi;" p. 274, line 26 from above, read "Manzano" for "Mansano;" pp. 285, 286, for "Plate LXX," read "Plate LXXI."



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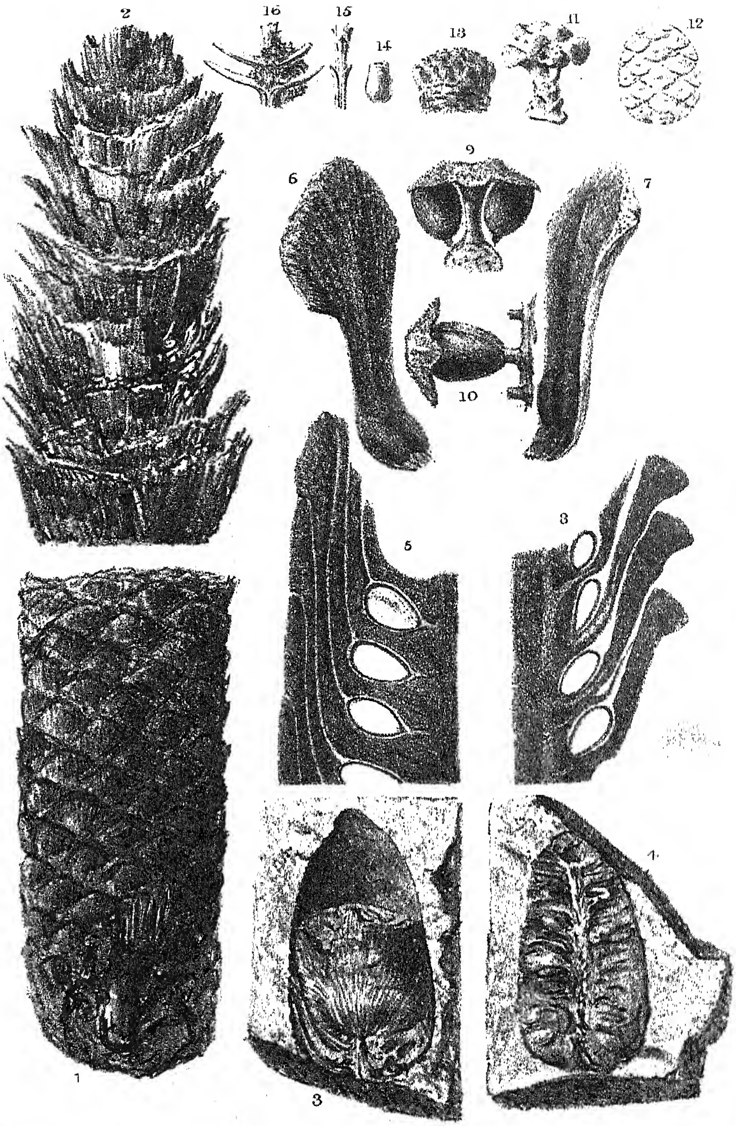
of Secondary & Tertiary age.



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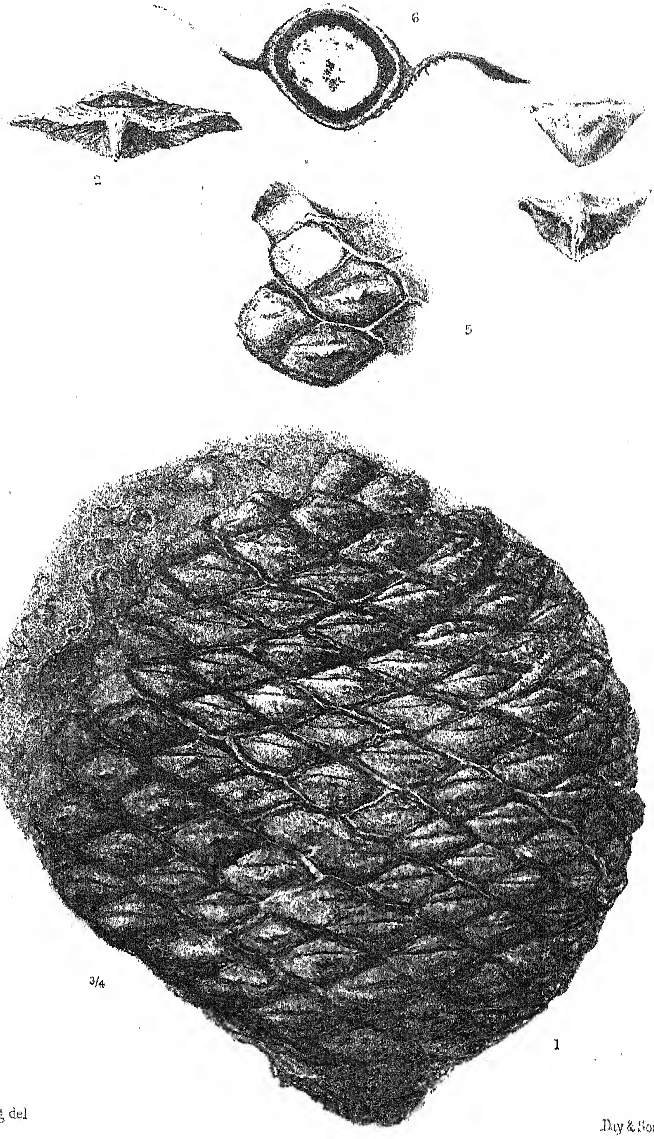

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THE

JOURNAL OF BOTANY,

BRITISH AND FOREIGN.

ON GYMNOSPERMATOUS FRUITS FROM THE SECONDARY ROCKS OF BRITAIN.

By William Carruthers, F.L.S.,
BOTANICAL DEPARTMENT, BRITISH MUSEUM.

(Plates LVII.–LX.)

Two of the gymnospermatous Orders are represented by fruits found in Secondary strata, viz. *Cycadeæ* and *Coniferæ*; no remains have been observed, as far as I know, of any plant belonging to the *Gnetaceæ*. There is satisfactory evidence of the existence of *Coniferæ* from the period of the Old Red Sandstone; but it is very doubtful whether the Palæozoic fruits and leaves which have been referred to *Cycadeæ* have anything whatever to do with that Order.

Fossil wood, leaves, and fruits, afford the means of determining the existence of vegetables during any geological period.

The trunks and foliage of *Cycadeæ* are so remarkable that fossil fragments of them can, as a rule, be determined with certainty. The trunks are generally short, and composed externally of the bases of the leaves, while internally they consist of a large medulla, either simple or traversed by numerous vascular bundles, and surrounded by one or more woody cylinders. The trunks from Purbeck, which Buckland named *Cycadoidea*, and those from the Wealden, named *Clathraria* by Mantell, have all the characters of Cycadean stems. The leaves are remarkably uniform in the modern representatives of

the Order. With a single exception they are pinnated, hard, and woody, and the leaflets have fine simple parallel veins. The genus *Stangeria* has parallel forked veins like those of a *Lomaria*, and we fear that this anomalous structure has induced palæontologists to place among the *Cycadeæ* some fossils which would more correctly be referred to Ferns. The cones of *Cycadeæ* are less frequent fossils than either the leaves or the stems.

Leaves of *Coniferæ* are rare, and when alone are unsatisfactory evidence, as their forms and arrangement on the stem are similar in many *Coniferæ* to what are found in other and very different Orders of plants. The fruits and wood are more frequent, and are also more satisfactory indications of the organisms to which they belong. Coniferous wood exhibits a peculiar structure which cannot be mistaken, and which is found in no other set of plants. This structure is the absence of any dotted ducts in the concentric layers of wood, and the presence of disks in the lateral walls of the woody fibre. The disk-bearing tissue alone is not sufficient to determine a fragment of wood to be coniferous, as this structure is found also in the wood of several *Magnoliaceæ*, but the two characters together are found in no known wood except that of *Coniferæ* proper, and their gymnospermatous allies. The fruits, again, are peculiar to this Order, for while cones are found in some *Proteaceæ*, the internal structure is very different, the seeds being contained in true seed-vessels, and rising from the axis in the axils of the scales or bracts; the pseudo-cones produced in diseased branches in some other plants can easily be distinguished, as they never contain seeds. True coniferous cones have been referred to *Cycadeæ*, and Cycadean cones to *Coniferæ*, and this is not to be wondered at, as in Orders so nearly allied, and in both of which the female flower is evidently constructed on the same plan, difficulty in discrimination might be expected. There are, however, characters by which they can be separated, and an exposition of these will enable the reader to appreciate the reasons why, in the sequel, I refer particular cones to the one Order or the other.

The Cycadean fruit is of more simple structure than that of *Coniferæ*. In *Cycas* the female spadix is a contracted leaf bearing seeds on its margins. If the fruit-bearing leaf or spadix be considered the representative of the corresponding organs which bear the seed in the other *Cycadeæ*, we find that in all the other genera of the Order, the

spadices are converted into peltate or flat pedicellate scales, spirally arranged around a common axis, and forming a cone. The pedicels of the scales are placed at a right angle to the axis, or very nearly so, and in all the genera, except *Dion*,* the scales are peltate, and not imbricate. Each spadix or scale supports two seeds which hang free from the peltate apex (Plate LIX. Fig. 9 and 10), on either side of the pedicel. In *Dion* the spadices are flat scales forming an imbricated cone, which Lindley, the author of the genus, says, is "almost undistinguishable" from the cone of *Araucaria*. We can scarcely see any point that the two cones have in common, except that they are cones. The Araucarian cone has firm, sessile, smooth scales, each bearing a single adnate seed, while in the cone of *Dion*, the scales are composed of lax tissue, pedicellate, and covered with a dense and copious wool, and each supports two free seeds.

Three kinds of fruit are found in the *Coniferæ*. First, the cone of the *Abietineæ*, composed of imbricated sessile scales, generally regarded as flat and open carpels, each of which bears one or two seeds, lying on its surface, at or towards the base, and is subtended by another scale, considered to be a bract. Second, the cone of the *Cupressineæ*, composed of indurated peltate scales, or, sometimes fleshy, with the scales concreted so as to form a kind of drupe. One or more winged seeds are supported on each scale. Thirdly, the drupaceous or nut-like fruit of *Taxineæ*, with its single terminal seed. The fruit of *Taxineæ*, and the drupe-like fruit of some *Cupressineæ* cannot be confounded with the cones of *Cycadeæ*. The form of scale, the arrangement of the scales on the cone, and the number and position of the seeds, are obvious diversities whereby to distinguish the indurated cone of the remaining *Cupressineæ* from that of *Cycadeæ;* while the sessile, flat, imbricated scale, bearing the seeds adnate to its upper surface, clearly separates the cone of the *Abietineæ*. Any difficulty in determining the affinity of a cone by its external characters can easily be solved, as to whether it is Coniferous, Cycadean, or Proteaceous, by a transverse section, which would show, if the structure is even a little preserved, the form of the scale, and the position of the seed.

We may further add that the scales of the Cycadean cone have a

* Lindley spelled this word *Dion*, omitting the second *o*, after the example of the ancients—as ἐπωασμὸς (Aristotle, Hist. Anim.). *Dioon* is therefore incorrect.

much simpler arrangement than in that of *Coniferæ*. In *Cycadeæ* the scales are arranged either in a vertical series, as in the female cone of *Zamia*, or the secondary spirals consist of only two series, and the amount of obliquity in their direction is the same whether they wind to the left or to the right, as in *Encephalartos*.

Cycadeæ.

Corda in Reuss's 'Die Versteinerungen der Böhmischen Kreideformation,' says he has never seen any real fossil Cycadean fruits, except the two that he there describes. These are *Microzamia gibba*, a female cone, unlike any recent Cycadean cone in having from three to six seeds supported by each scale, and *Zamiostrobus familiaris*, which from the form of the scales, and from having vascular bundles scattered through the medulla of the axis, he considers a true Cycad, and probably the male cone of the former species. Endlicher established the genus *Zamiostrobus* for a cone he believed to be Cycadean. But as will presently be shown, it was founded in error, and great confusion has since been created by making it the receptacle for cones, whose affinities could not be made out. Of the seven species now placed in the genus, four are in this paper referred to the *Coniferæ*. What *Z. Fittoni*, Ung., may be or may not be, it is impossible to say from Fitton's drawing in the 'Geological Transactions,' 2nd series, vol. iv. t. xxii. f. 11. Fitton had a longitudinal section of it made, but he tells us (l. c. p. 349) that it "did not exhibit any indication of vegetable structure." In the British Museum there is a cast of a cone belonging to C. B. Rose, Esq., which corresponds remarkably with Fitton's figure. It was obtained from the Lower Greensand at Downham, near Lynn, Norfolk; but I believe the original specimen has decomposed, like so many pyritic fossils, so that it can throw no light on the matter. Corda, after a fresh examination of *Z. familiaris*, Ung., has shown it to be Cycadean; and the remaining species, *Z. crassus*, is most probably Cycadean, although the materials for its determination are not entirely satisfactory.

A singular fossil occurs at Runswick Bay in the Lower Oolite, to which Lindley and Hutton give the name of *Zamia gigas*. James Yates, Esq., and Prof. Williamson, have examined the structure of this plant. Prof. Williamson originally considered the "collar" (the so-called fruit of the fossil) as a series of protecting scales, beyond which the

axis was prolonged to support a cone.* Mr. Yates, whose extensive acquaintance with *Cycadeæ* is well known, and who has greatly helped me in my investigations, not only with his advice but also by presenting his large collection of dried specimens of Cycadean stems, foliage, and fruit, to the British Museum, saw no indication of this cone in the numerous specimens he examined. He says, regarding this fossil,† that its pinnate leaves "have unquestionably a very close resemblance to the leaves of *Zamia*. But here the analogy seems to cease. The stem does not resemble the stem or the mode of growth of any recent species of *Zamia*, and a still greater difficulty presents itself in its fruit." Mr. Yates considers that the "collar" contains the fruit, and Prof. Williamson seems to have ultimately arrived at the same conclusion, for he says ‡ the fossil contains two distinct forms of fruits. "The one, a curious scaly axis, prolonged in a peculiar pyriform manner, which latter part has been invested by a cortical substance, consisting of oblong cells arranged perpendicularly to the axis. This was probably the antheriferous portion. The second form consists of a concave disk, which has evidently terminated the woody axis, and been margined by a peripheral circle of radiating bracts. On the upper portion of each of these bracts are two small oblong depressions which may have supported two ovules." I have examined numerous specimens of this fossil in the British Museum, but have been unable to determine satisfactorily anything in regard to the precise structure of this anomalous fruit. It presents so many peculiarities unknown in the fruit of any modern Cycad, that for the present at least, and notwithstanding its Zamia-like leaves, I must consider it a doubtful Cycad.

The cones I am about to describe have several features in common, which show that they belong to this Order. They have all the simple arrangement, or phyllotaxis of the scales of the cones. The peduncle, when indications of it are present, as in *C. elegans* and *C. truncatus*, is larger than in Coniferous cones of the same size. The cones are converted into iron pyrites, a mineral condition unfavourable to the preservation of structure, but the arrangement of the mineral shows that the general direction of the parts of which the cone was composed was at right angles to the axis (Tab. LVII. Fig. 2). A specimen from the collection of the late Robert Brown, which he had sliced,

* Proceedings of York Phil. Soc., 1847, p. 46. † Ib. p. 39.
‡ Transactions of the British Association, 1854, p. 103.

fortunately exhibits, to some extent, the internal structure. This fragmentary specimen is a portion of the base of a cone (Fig. 4), and the magnified section (Fig. 5) is perpendicular to the axis. The axis itself is wanting. The scales leave the axis at a right angle, except those at the very base, which slightly incline downwards. They have a thickened peltate apex, not imbricated, composed of loose cellular tissue. The longitudinal section necessarily shows a single seed connected with each scale. The seed had a thick testa, indicated by the thick dark line in the sketch. The contents of the seed have disappeared, leaving only the shrivelled-up tegmen still attached at the base of the seed, though apparently free at the apex. A rolled cone, four scales of which are represented at Fig. 7, has the apices of the scales nearly rubbed off, and exhibits the bases of the seeds at their attachment to the scale; and this shows that there are only two seeds to each scale.

The recent genus to which these fruits are most nearly related is the South African genus *Encephalartos*. Associated with the cones at Brook Point are found trunks of *Clathraria*, of which, no doubt, they were the fruits. The form and structure of these trunks confirm the affinity of the Wealden Cycads to *Encephalartos*. In both the trunks are tall and cylindrical, and the medulla is traversed by numerous vascular bundles.

As long as we are unable to refer these fruits to the species to which they belong, it is desirable that they should have provisional names by which they may be known. To prevent confusion, I will avoid Endlicher's generic name *Zamiostrobus*, and propose *Cycadeostrobus* as a suitable designation, giving no further definition to the genus than that it contains fossils that are supposed to be the fruits of *Cycadeæ*.

1. *Cycadeostrobus ovatus*. Cone ovate; scales somewhat broader than deep. (Plate LVII. Figs. 1 and 2.)

The specimen of this cone, which is two inches long by a little more than one and a half broad, is less compressed than the other specimens figured. It has been cut longitudinally through the axis, but does not exhibit any structure.

From the Wealden at Brook Point, Isle of Wight.

2. *C. truncatus*. Cone ovate, truncate, and widest at the base, narrowing upwards from the middle to its obtuse apex; scales about a third broader than deep. (Plate LVII. Fig. 3.)

There are three specimens of this cone in the British Museum, from the collection of Dr. Mantell. One specimen has the scar of a large peduncle. In another the scales are preserved in relief, and show that they had a tumid pyramidal apex.

From the Wealden, at Brook Point.

3. *C. tumidus.* Cone oblong-acuminate; scales about as broad as long, the apex rising into a tumid pyramid. (Plate LVII. Fig. 6.)

A single specimen of this distinct little cone, an inch and a quarter long by three-quarters broad, without locality, is in the British Museum. It is probably from Brook Point.

4. *C. elegans.* Cone ovoid, truncate below; scales nearly as deep as they are wide. (Plate LVII. Fig. 9.)

There are two specimens of this cone in the British Museum, from the collection of Lady Hastings. They are two and a half inches long by one and a half broad. The base is not only truncate but somewhat indented, and there is the remains of a large peduncle, having a diameter of nearly half an inch.

From the Wealden, Brook Point.

5. *C. Walkeri.* Cone oblong; scales broader than deep.

This cone is figured by Mr. J. F. Walker in the Annals and Mag. of Nat. Hist. ser. 3, vol. 18 (Plate XIII. Fig. 5), and described as a Cycadean cone (p. 384), two and a half inches long and two and three-quarters in circumference. The specimen is evidently very much water-worn. Perhaps the specimen in the British Museum, from which the four scales (Plate LVII. Fig. 7) were drawn, belongs to this species.

From a phosphatic deposit in the Lower Greensand, at Sandy, Bedfordshire, probably of Wealden age.

6. *C. sphærica.* Cone spherical; scales as deep as they are broad. (Plate LVII. Fig. 8.)

This cone is very much compressed and imperfectly preserved, but is evidently different from the others.

From the Oxford clay of Wiltshire.

7. *C. primæva.* Cone ovate; scales as broad as they are deep.—*Pinus primæva*, Lindl. and Hutt. Foss. Fl. Tabl. 135. *Pinites primæva*, Morris, Cat. p. .

The scales of this cone are six deep and six round. Each one is dilated at its extremity and gradually thins away towards the axis.

From the Inferior Oolite at Burcott Wood and Livingstone.

8. *C. Brunonis*. Scales twice as broad as they are deep. (Plate LVII. Fig. 4 and 5.)

The single specimen of this species is a fragment from the base of a large cone. It is from the collection of the late Robert Brown. The fragment is two inches in diameter. The very broad scales easily separate it from the other species.

Locality unknown.

9. (?) *Zamia crassa*, Lindl. and Hutt. Foss. Flor. t. 136. This is probably a Cycadean cone. The authors of the 'Fossil Flora' describe it as having "in transverse section numerous seeds lying below the thickened ends of the scales at a considerable distance from the thick axis." It is too imperfect to decide positively as to its affinities.

From the Wealden, at Yarenland, Isle of Wight.

CONIFERÆ.

1. *Pinites macrocephalus*, Car. Geol. Mag. iii. p. 536. Cone cylindrical, obtuse at both ends; scales with thick and flat, irregularly six-sided apophyses; basal scales largest.*—*Zamia macrocephala*, Lindl. and Hutt. Foss. Flor. ii. p. 117, pl. cxxv. *Zamiostrobus macrocephalus*, Endl. Genera Plantarum, p. 72. *Zamites macrocephalus*, Morris, Ann. of Nat. Hist. ser. 1, vol. vii. p. 116. *Zamiostrobus Henslowii*, Miquel, Monographia Cycadearum, p. 75.

I have examined four cones of this species, one belonging to G. Dowker, Esq., one to N. T. Wetherell, Esq., and the others in the collection of the British Museum.

The cone is cylindrical in shape, very slightly tapering upwards, and obtuse at both extremities. It is from 4½ inches (Henslow) to nearly 6 inches (Dowker) in length, and almost 2¼ inches across. The axis is about a quarter of an inch in diameter. The scales are broad and sessile. They leave the axis almost at a right angle, and just outside the seed they bend sharply upwards, continuing with a slightly outward direction until they approach the surface, where they swell into the large thickened apophyses or hexagonal apices. These having the appearance externally of being valvate, give the cone a Cycadean aspect; but they scarcely differ from those of *Pinus Pinea*, L. Indeed, in the form, size, and arrangement of the apophyses, this species re-

* I have included this species and the next in this paper, as it was only in the course of my examination of them that I found they were Tertiary and not Secondary fossils.

markably resembles the fossil cone. The form of the cone and its internal structure is, however, very different, and the fossil is unlike all recent Abietineous cones with which I am acquainted, in having the basal scales larger than those of the body. The basal scales are barren, and the apophyses rise from their whole surface; in the series immedidiately above them there is a short flat body to the scale, but the greater portion of the scale is covered with the apophysis; the third series are fertile, and have a longer and more ascending body. The outer surface of the apex or apophysis of the scale is destroyed in the specimens I have examined. The Bowerbank fragment is the most perfect in this respect. In it the apex is three-eighths of an inch thick, and the surface of each scale is slightly convex on the centre of its upper portion. Henslow made a diagram of the phyllotaxis of the cone, and he considers that the arrangement of the scales is represented by the fraction $\frac{11}{29}$. This is an anomalous arrangement, and does not belong to the recognised series. In Mr. Dowker's cone there are three spirals to the left and eight to the right, so that this cone belongs to the eight-ranked arrangement, represented by $\frac{3}{8}$. Each scale supports two seeds in the hollowed superior surface near its base. The seeds are oval, nearly half an inch long, and are apparently wingless.

Having explained, at length, the difference between the Cycadean and Coniferous cones, the description I have just given sufficiently establishes that this fossil is a Coniferous fruit. The thickened apophyses would indicate its affinities to the *Pinus vera* section of the genus, but it is remarkably different, as I have pointed out in the large size of the basal scales. The longitudinal section of a portion of *P. Pinaster*, Sol. (Plate LIX. Fig. 8), shows how nearly the internal arrangement of the parts of the recent cone agree with the fossil as figured by its side (Fig. 5).

This fossil was originally figured and described by Henslow in the "Fossil Flora." He referred it to the genus *Zamia*, and in estimating its relations to modern plants he said it differed from the figure of *Zamia* in Richard's 'Mémoires sur les Conifères et les Cycadées,' t. 26, in its more slender axis, longer scales, and the inclination of the seeds consequent on the form and upward direction of the scales. He inserts in the text, a diagrammatic longitudinal section of the cone, making each scale support the seeds pendent from a little below the middle of the upper surface, somewhat after the manner of a Cycadean fruit. In

the flat ideal section which he gives, he could exhibit only a single seed attached to each scale; his object was to show the method of attachment, and not the number of seeds on each. Lindley adds a particular description of the specimen, and agrees with Henslow as to the affinities of the fossil, asserting that its relation to *Zamia* is shown "in every point of its structure."

Endlicher, in his revision of the *Cycadeæ* for the 'Genera Plantarum' (1836), established the genus *Zamiostrobus* for this cone, giving as the most remarkable character of the genus, that the carpellary scale bore on its upper surface, a little below the middle, *a single seed*. Neither Henslow nor Lindley specified the number of seeds borne on each scale, and Endlicher, misled by Henslow's diagram, erroneously assumes that there is only one, and on this establishes a new genus, which, with good reason, he characterizes as a very remarkable one. He considers it intermediate between *Encephalartos* and *Zamia*.

Presl, in Sternberg's 'Flora,' parts vii. and viii. p. 195 (1838), established the genus *Zamites*, giving in his diagnosis of the genus the characters of the fruit as—strobiliform, oval, pedunculate, with large imbricated scales spirally arranged. He describes twenty-five species, five based on stems and the remaining twenty on leaves. Where he got his fruit characters is not apparent, as he does not seem to have had any specimens of fruit. Morris, in a revision of the fossil *Cycadeæ*, published in the 'Annals of Natural History,' 1st series, vol. vii. p. 115 (1841), adopts Presl's genus, and places in it the fruits figured by Lindley and Hutton under the names of *Zamia crassa*, *Z. macrocephala*, and *Z. ovata*.

Miquel, in his 'Monographia Cycadearum' (1842), accepts Endlicher's genus *Zamiostrobus*, but places it at the end of the Order on account of its anomalous one-seeded carpellary scale. Göppert also adopts this genus ('Uebersicht der Schlesischen Gesellschaft,' 1844, p. 128), considering, with Endlicher and Miquel, that it is the type of an extinct tribe of *Cycadeæ*. He adds three additional species which had been referred by Morris, in the first edition of his 'Catalogue of British Fossils,' to *Zamites*. I think, with him, that it is well to have a provisional genus for detached fossil Zamia-like fruits until their relation to stem and foliage has been established, but I regret that he adopted Endlicher's genus with the original description, and placed in it three additional cones, the internal structure of two of which was

altogether unknown; and that of the third, as far as known, was totally different from the supposed structure of *Z. macrocephalus*. The confusion thus introduced was increased by Unger, who added three other species in his 'Genera et Species Plantarum Fossilium,' 1850, not one of which had, as far as was then known, anything in common but its strobiliform shape. Miquel, in his 'Prodromus Systematis Cycadearum,' 1861, gives all the seven species, adding in a note that perhaps some are species of *Cupressineæ*, and specially querying *Z. crassus*, the only one in the seven which is probably Cycadean.

Corda, in Reuss's 'Die Versteinerungen der Böhmischen Kreideformation,' vol. ii. p. 84 (1846), carefully examines the affinities of *Zamia macrocephala*. From its structure he concludes that it is certainly not a species of *Zamia*, as the scales are arranged in a different order, and the seeds are on the upper surface of the scales, unless, as he suggests, the woodcut by Henslow is a mere fiction. He shows that it is totally different from *Dion*, the only recent genus of *Cycadeæ* with imbricated scales. And he concludes that if it has seeds in pairs on one plane, or even a single seed, it may be a Conifer, belonging to a new genus allied to *Dammara*, if it is not a species of *Dammara* itself. He thinks Endlicher did well in creating the Cycadean genus *Zamiostrobus* for it. Except that Corda did not observe that Henslow's figure was a diagrammatic restoration, to show his notion of the relation of the seed to the scale, and consequently, like Endlicher, misinterprets it, he has from the materials at his command made a very masterly investigation of the affinities of this fossil.

There has been an error in regard to the age as well as to the structure of this singular cone, but Mr. Dowker having found his specimen *in situ*, in a pit near Canterbury, has established that it is of Tertiary age.

2. *P. ovatus*, Car., Geol. Mag. iii. p. 540. Cone ovate, with a truncate base and obtuse apex; scales with thickened, flat, subquadrangular apophyses; basal scales largest.—*Zamia ovata*, Lindl. and Hutt., Fossil Flora, vol. iii. p. 189, pl. 226 A. *Zamites ovata*, Morris, Ann. Nat. Hist. 1st series, vol. vii. p. 116. *Zamiostrobus ovatus*, Göpp., Uebers. d. Schles. Ges. 1844, p. 129.

There is an imperfect specimen of this cone, without the apex, in the British Museum, from the Cowderoy collection, which, as far as it goes, answers in every respect to that figured by Lindley and Hutton.

The cone is smaller than *P. macrocephalus*, and can readily be distinguished from it by the form of the apophyses of the scales, which are longer than they are broad, and quadrangular or subquadrangular, the upper and lower angles being acute or but slightly truncate. They both agree in the great size of the scales at the base of the cone, a structure peculiar to these two species, but not sufficient, as it appears to me to separate them from the genus *Pinites*. A transverse section of the specimen in the Museum, exhibiting the structure beautifully preserved, shows that it had a slender axis, the centre of which is occupied with cellular tissue, and surrounded by a cylinder of wood. Being transverse, the section cannot exhibit the disks on the vascular tissue, but it exactly agrees with transverse sections of recent cones. A regular series of large ducts are arranged symmetrically around the axis. Each scale supports two seeds. The tissue of these has entirely disappeared, the cavity being filled with carbonate of lime. Three other scales are seen beyond that bearing the seeds in the section, Plate LVIII., Fig. 4.

The Cowderoy specimen is without locality, and that described and figured by Lindley and Hutton is a rolled fossil, which was found upon the coast of Kent, near Faversham. These authors refer it to the Greensand, because of its affinity to their *Z. macrocephala;* for the same reason I consider it more likely to be of Tertiary age, and the locality where it was found would favour this opinion rather than the other.

3. *P. oblongus*, Endl., Synops. Conif. p. 284. Cone cylindrical; scales broad and thin at the apex, with the seeds very near the base; axis slender.—*Abies oblonga*, Lindl. and Hutt., Fossil Flora, vol. ii., p. 155, pl. 137. *Abietites oblongus*, Göpp., Fossil. Conif. p. 207.

I know this species only from Lindley and Hutton's drawing and description, who believe it to be from the Greensand Cliff, near Lyme Regis.

4. *P. Benstedi*, Endl., Synops. Conif. p. 283. Cone oval; scales broad and thin at the apex, leaving the thick axis at a right angle, then ascending beyond the seed.—*Abies Benstedi*, Mant., Quart. Journ. Geol. Soc. vol. ii. p. 52, pl. ii. fig. 2. *Abietites Benstedi*, Göpp., Fossil. Conif. p. 217.

The single cone described by Mantell, and on which the species is founded, is now in the British Museum. It is an inch and five-eighths long and one and a quarter broad. It is nearly perfect. The section

is accurately figured by Mantell; but the artist, in restoring the external aspect, has made the exposed apices of the scales nearly equal-sided, whereas, in the specimen, they are at least four times broader than they are deep. The axis occupies somewhat more than a third of the diameter of the cone. The position and shape of the seeds, the form of the scales, the shape of the exposed apices, and the general aspect of the cone, are very like those of a Cedar. It may be compared with *Pinus (Cedrus) Atlantica*, Endl.

5. *P. Sussexiensis*, Car., Geol. Mag. iii. p. 541. Cone oblong, truncate at both ends; axis slender; scales leaving the axis at a very acute angle, bearing two ovate seeds in a hollow, very near the base; scale in transverse section triangular.—*Zamia Sussexiensis*, Mantell, Quart. Journ. Geol. Soc., vol. ii. p. 51, pl. ii. fig. 1. *Zamites Sussexiensis*, Morris, British Fossils, 1st ed., p. 25.—*Zamiostrobus Sussexiensis*, Göpp. Uebers. d. Schles. Gesellsch. 1844, p. 129.

The specimen, which is the one described and figured by Mantell, is $5\frac{1}{2}$ inches long, and nearly 2 inches diameter. The apex is almost perfect, but the base wants one or more whorls of scales; the small stalk referred to by Mantell is a portion of the axis from which the absent scales have fallen. The cone is so much decayed on the outer surface that the apices of the scales are mostly absent; but a portion which still retains some of the matrix in which it was preserved seems to show the form of the apex. It was a flat scale, like that of *Pinus Strobus*, L., but the superior margin had a tumid border, without any terminal umbo. The scales in transverse section, as exposed on the weathered surface, are sub-triangular as figured by Mantell, and on the upper portion of our Fig. 5. The axis is slender, and the scales on leaving it take at once their ascending direction. The two narrow ovate seeds are borne very near the base of the scale, in a cavity sunk into it. The two cavities shown in Fig. 5, are formed by the testa of the seeds, the contents having disappeared.

Mantell submitted a plaster cast of this fossil to Brongniart, but as might have been expected, that distinguished palæontologist was unable, with such materials, to determine anything positive in regard to it. Mantell had no hesitation in referring it to *Zamia*, as a fruit of that genus, and every subsequent writer has followed him. The fossil certainly belongs to the *Pinus* division of the genus, and is near to *Pinus Strobus*, L.

The specimen is from the Lower Greensand at Selmeston, Sussex.

6. *P. Dunkeri*, Car., Geol. Mag. iii. 542. Cone elongated, cylindrical; scales broad, with a rounded and thin apex; axis slender; seeds oval, compressed.—*Abietites Dunkeri*, Mant., Geol. Isle of Wight, 2nd ed. p. 452, 3rd ed. p. 337, Lignographs 43 and 42, fig. 5 (exclude fig. 1–4 and 6, which belong to a Cycadean fruit); Med. of Creation, p. 179, Lign. 61.

There are many specimens of this species in the British Museum.

This is a very remarkable cone, little more than an inch in diameter, yet attaining a length of thirteen inches. The cones have generally opened before they were buried in the sand in which they are preserved, and as the sand has penetrated between the expanded scales, they are always broken when the fossils are exposed, their apices still remaining in the piece of rock which has been separated, just as the scales on the side of the cone are seen to penetrate the rock in which the fossil is imbedded (Plate LIX. Fig. 2). This condition and aspect of the cone has led Mantell into the error of supposing that it was furnished with large foliaceous bracts, which he has represented in his somewhat restored figure in the 'Medals of Creation,' p. 179. I was fortunate enough to remove the stony matrix from one of his specimens, which had been buried unopened, and which exhibits the form of the scales (Plate LIX. Fig. 1). The apices are rhomb-shaped, but with the upper angle somewhat rounded. There is no indication of bracts. The fossil has the aspect of a very elongated and cylindrical cone of *Pinus Abies*, L., to which it is evidently nearly allied.

This species has been found in the Wealden of Tilgate Forest, and of Brook Point, Isle of Wight.

There are fragments of two cones from Brook Point in the British Museum, the one more slender than *P. Dunkeri*, and the other being at least twice its diameter, but whether they belong to this species or are different the materials are not sufficient to determine.

7. *P. Mantellii*, Car., Geol. Mag. iii. 543. Cone ovate-acuminate; scales broad, flat, and thin at the apex; axis slender; seeds roundish (Plate LIX. Fig. 3).

This cone is about an inch and three-quarters long, by fully three-quarters broad. The specimen is fragmentary, but the form of the cone is preserved in the matrix. The apex of the scale is very broad and thin.

From the Iguanodon quarry at Maidstone, Kent.

8. *P. patens*, Car., Geol. Mag. iii. 243. Cone ovate-acuminate; scales leaving the slender axis at a right angle, and supporting large seeds (Plate LIX. Fig. 4).

The single specimen of this cone, which shows only a longitudinal section through the axis, is sufficiently different from the last species to warrant its being separated as distinct. The seeds are large, and in section of an oblong form.

From the Iguanodon quarry.

9. *P. Fittoni*, Car., Geol. Mag. iii. 543. Cone ovoid, truncate at the base, tapering upwards; apophysis of the scale pyramidal, with a ridge across it; umbo terminating the apex of the pyramid. "A cone," Fitton, Geol. Trans., 2nd series, vol. iv. p. 230, pl. xxii. fig. 9.—*Dammarites Fittoni*, Ung., Gen. et Sp. Pl. Foss. p. 384.

This cone is said by Fitton to have "some slight resemblance to the cone of a *Dammara* of the Moluccas." He must have made a slip of the pen in this statement, or transferred a note in regard to one fossil by a mistake to this, for his very characteristic drawing, on the face of it, contradicts his supposed resemblance. The cone has much more affinity to the Scotch Fir, but on the faith of this supposed "slight resemblance," Unger, in giving the fossil a name, places it in the genus *Dammarites!*

The cone is an inch and half long by a little over an inch broad. The apophyses of the scales in the middle of the cone are about twice as long as deep. They are pyramidal, having a sharp keel which runs across the whole of the scale. The umbo has terminated the apex of the paraphysis, but only the cicatrix is seen, and from the direction it takes the umbo seems to have had a somewhat downward direction, as in *Pinus rigida*. The fossil in other respects very much resembles this species, except in its smaller size.

The cone is labelled from Purbeck, without locality or name of collector.

10. *P. elongatus*, Endl., Synops. Conif. p. 286. Cone elongated, cylindrical; scales very broad and thin.—*Strobilites elongatus*, Lindl. and Hutt., Fossil Flora, vol. ii. p. 23. t. 29.

I know this fossil only from Lindley and Hutton's drawing and description. It appears to be a true cone, but so fragmentary that until additional specimens are obtained nothing satisfactory can be made of

it. The specimen figured has been an open cone, like the majority of those of *P. Dunkeri*, and in breaking the rounded nodule in which it occurred all the external characters have been lost.

From the Lias of Lyme Regis.

1. *Araucarites sphærocarpus*, Pl. LX. Fig. 1. Cone spherical. Scales rhomboidal, with a central ridge produced into a stout, somewhat reflexed spine, and an obvious furrow dividing the scale into an upper and lower portion. Twenty to twenty-four scales in each spiral series in the centre of the cone.—*Araucaria sphærocarpa*, Car., Geol. Mag. iii. p. 350.

From the Inferior Oolite, Bruton, Somersetshire.

The only specimen of *A. sphærocarpa* yet found (Plate LX.) was obtained from a bed of marine limestone. It is noticed by Sir Charles Lyell in the last edition of his 'Elements,' where a woodcut is given, but without any description. The detached cone has been floated out to sea, where, having sunk, it has been partially buried in the calcareous mud among the remains of *Serpulæ* and *Mollusca*. The spaces between the scales have first been filled with calcareous matter, shown in the figure by the irregular white lines separating the scales. The organism having decayed, the upper portion is entirely lost; but calcareous mud having been deposited in the mould of the buried portion a remarkably perfect impression of that half of the cone remains. The base is imperfect; the two or three series of basal scales, which are more or less triangular in outline, are wanting. There is no indication of any stalk. The draughtsman of the woodcut in Lyell's 'Elements' has mistaken a fragment of a shell for the stalk, and has given, in his restoration, an aspect to the cone unlike any known *Araucaria*. The upper portion of the cone is more perfect, and exhibits the change in the form of the scales observed in recent cones. (Compare Plate LX. Fig. 5, one of the apical scales, with Fig. 6, a similar scale, from the cone of *A. Bidwilli*, Hook.) The fossil is five inches long, and as many inches broad at its widest part. The apex of the scale is a rhomboid. It is divided into two unequal portions by a transverse scar; the lower and larger half has been furnished with a strong and somewhat reflexed spine. A fracture in two of the scales on the upper left-hand portion of the fossil, figured of the natural size at Fig. 5, shows that the scar is superficial, and that each scale supports a single seed.

2. *Araucarites Pippingfordiensis.* Cone oblong, gradually decreasing towards the blunt apex. Scales rhomboidal, with a prominent central ridge, and an obvious furrow dividing the scale into an upper and lower portion. Fourteen to sixteen scales in each spiral series in the centre of the cone.—"A cone," Fitton, Geol. Trans., 2nd series, vol. iv. p. 181, pl. xxii. fig. 10. *Zamiostrobus Pippingfordiensis*, Ung., Gen. et Sp. Plant. Foss. p. 300. *Pinites Fittoni*, Mantell, Geol. Isle of Wight, 3rd edition, p. 330, footnote. *Araucaria Pippingfordiensis*, Car., Geol. Mag. vol. iii. p. 250.

From the Wealden, in a mass of hard greenish grit at Pippingford, in Ashdown Forest, very near the highest point of the ridge of the Hastings Sands.

Dr. Fitton figured *A. Pippingfordiensis*, and, without giving it a name, characterized it as a "cone of an unknown species, remarkable for the double ridge on most of the scales." Mantell (l. c.) has made some mistake as to his *Pinites Fittoni*. He quotes pl. xxii. fig. 10 (l. c.) for his species, and says it does not agree with *Dammara* because of the double ridge on the scale. But Fitton compares the cone (fig. 9, l. c.) with *Dammara*. It is, however, evident, from Mantell's remarks, that he means the cone which he quotes. A comparison of Dr. Fitton's figures with *A. sphærocarpa*, and with the recent species of *Araucaria*, belonging to the section *Eutacta*, has convinced me that it belongs to this genus.

Although the Bruton fossil is only a cast of the cone, it is so characteristic that it can be certainly referred to its modern allies. The single seed supported on each scale, along with the general form of the cone, conclusively establish it to be a true *Araucaria*. Sir W. J. Hooker describes *A. Cookii* ('Botanical Magazine,' vol. lxxviii. t. 4635) as having "two oblong seeds" in each scale,—a structure at variance with the generic character. I have carefully examined a number of scales from different cones, and I find that while the form of the cavity is different from that of the other species, it is truly unilocular, and contains a single seed. In its early stage a transverse section of the hard integument of the seed gives a dumb-bell-like outline, exhibiting two large open canals on either side, which freely communicate round the base of the seed, while the surfaces of the integument almost approach in the centre, and between these surfaces the single embryo is situated. As the seed grows, the contracted central portion enlarges, while the

lateral canals retain their original dimensions; and the ripe seed shows the unicellular cavity with its single seed and relatively slender lateral canals. An examination of the early stage of the scale would very readily give the erroneous impression that it contained two seeds, or, rather, that the hard integument was bilocular, and contained a single seed in each loculament.

Besides the species lately introduced by nurserymen which have not yet been satisfactorily described, the genus *Araucaria* contains six well-known species, four of which are natives of Polynesia, and the remaining two of South America. The species thus geographically grouped have so many peculiarities in common, that Salisbury proposed to establish two genera for them,—the one, *Colymbeia*, for the two American species, characterized, as regards the cone, by having the scales without wings; and the other, *Eutassa* (*Eutacta*, Link), for the Polynesian species, which have wings to the scale. Although these and the other characters obtained from the number of the anthers and cotyledons, the form of the leaves, and the germination, are of importance, they have not been considered by recent systematists of generic value, but sufficient only for the division of the genus into two natural sections. Another peculiarity is possessed by the majority of the Polynesian species, which is important in connection with our fossils. The Brazilian species never exhibit externally any division of the scale into an upper and under portion. The small upper scale, so evident in *A. Bidwilli* (Plate LX. Fig. 4) and *A. excelsa*, and in the two fossils, is so reduced in them that it is only discoverable on the upper surface of the scale after it has been withdrawn from the cone.* This small upper scale is larger in the fossil than in any of the recent species. Three different views are entertained regarding the nature of this portion of the scale. Richard† and Endlicher‡ describe it as an appendage to the seed; the late Sir W. J. Hooker§ supposes it to be the dilated "upper base" of the scale-leaf folded down upon its upper surface; and Prof. Dickson|| holding that the

* This character is wanting in *A. Cookii*, R. Br. (*A. columnaris*, Hook.) from New Caledonia. The scale of this species has perhaps the most largely-developed wings, but the small upper scale is even more reduced than in the American species.

† Richard, 'Mémoires sur les Conifères,' p. 87.

‡ Endlicher, 'Synopsis Coniferarum,' p. 184.

§ London Journ. of Botany, vol. ii. p. 504.

|| Edinburgh New Phil. Journ., 1861, p. 197.

scale of the Araucarian cone corresponds to the membranous bract which subtends the scale of the pine cone, supposes this to be the representative of the true scale in the cone of *Pinus*. But whether a seed appendage, the folded base of the leaf, or the representative of the scale in the pine cone, the matter of importance to us is that it is so largely developed in the Australian and fossil species. The specimen of *A. sphærocarpa* is so imperfectly preserved that it is difficult to say whether the scales were winged, but there seems to me to be indication of short wings. It is, however, evident that the fossils belong to the *Eutacta* section of the genus, and among the species the cones of *A. excelsa* approach most nearly to them in size and form, and in the structure of the scales.

The affinities of these cones to recent Australian species are the more interesting because Owen, Phillips, and Lyell have shown that the animals belonging to the same epoch have their nearest allies in that continent.

Thuyites expansus, Phillips. Two cones of this species are figured by Buchanan in the new edition of Murchison's 'Geology of Cheltenham,' 1845, tab. i. fig. 6*a* and 6*b*.

From the Stonesfield Slate.

Sequoiites Woodwardii, Car., Geol. Mag, iii. 544. Cone subglobose. Leaves of two kinds, the one subopposite, very short, acute, with a long decurrent base; the other squamose, linear, acuminate, subfalcate, with a broad nerve below.

This is a very interesting plant, and undoubtedly a fossil species of the genus *Sequoia*. I have, however, employed the name of *Sequoiites* in accordance with the almost universal practice of botanists,—a practice of great value in enabling one at once to distinguish the recent from the fossil species of a genus. The genus *Sequoia* is at present represented by two Californian species, the monster trees of that country known in our lawns and parks as Wellingtonias. Five other species have been reported from Tertiary strata, the oldest one being, as I believe, *S. Coutsiæ*, from Bovey Tracey. Debey cannot separate *Geinitzia* from *Sequoia*, and Heer, accepting this determination, supposes that *Sequoia* probably begins in the Cretaceous formation. We have here a genuine Cretaceous species from the Upper Greensand.

The leaves are of two kinds, the one very short and acute, scarcely leaving the branch from which they rise, but with very long decurrent

bases (fig. 15). The larger leaves scarcely differ from those of a variety of *Sequoia sempervirens*, Endl., in the herbarium of the British Museum, that was collected by Bridges in California in 1846; they are also similarly arranged on the branch, being scattered around the axis, and having an upward direction and a subfalcate form. The nerve below is broad, and bounded by two furrows similar to those in the recent species which bear the rows of stomata (fig. 16). The apex of the fertile branch (fig. 13, double the natural size) is crowded with erect sessile ovules, each showing the opening through the testa at the apex (fig. 14). The scales have been broken off, but the scars can be detected. The cone is about two-thirds the size of those on the recent specimen to which I have referred. The vertical rank consists of six scales. In form and arrangement they exactly agree with *S. sempervirens*, Endl. There are no remains of the seeds.

The specimens are from the Upper Greensand of Blackdown, Dorsetshire.

Hugh Miller found detached Coniferous cones in the Oolite at Helmsdale, Sutherland, and a "cone with long bracts like *Pinus bracteata*" in the Lias of Cromarty. Cycadean remains have also been found in the same beds, but I have not been able to examine the specimens, and they have not been described.

I have omitted in this paper the cones of the Trias, as I am little acquainted with the fossils of that period.

Explanation of Plates LVII.–LX.

⁂ I am indebted to my colleague, Mr. H. Woodward, for the use of Plates LVIII., LIX., and LX., which have already appeared in his 'Geological Magazine,' along with the descriptions of the species figured on them.

Plate LVII.—Fig. 1. *Cycadoostrobus ovatus*. Fig. 2. Longitudinal section of ditto. Fig. 3. *C. truncatus*. Fig. 4. *C. Brunonis*. Fig. 5. Portion of a longitudinal section of ditto (double the natural size). Fig. 6. *C. tumidus*. Fig. 7. Four scales of a water-worn cone, showing the bases of the two seeds under each scale. Fig. 8. *C. sphærica*. Fig. 9. *C. elegans*.

Plate LVIII.—Fig. 1. Cone of *Pinites macrocephalus*, with the apophyses of some scales restored (slightly reduced). From Mr. Dowker's collection. Fig. 2. Diagram of transverse section of ditto from the Bowerbank specimen. Fig. 3. Base of a cone of *P. ovatus*. Fig. 4. Transverse section of ditto. Fig. 5. Cone of *P. Sussexiensis*. Fig. 6. Transverse section of ditto.

Plate LIX.—Fig. 1. Part of an unopened cone of *Pinites Dunkeri*. Fig. 2. Part of an open cone of ditto. Fig. 3. Cone of *P. Mantellii*. Fig. 4. Cone of *P. patens*. Fig. 5. Longitudinal section of *P. macrocephalus*, from Robert Brown's collection. Fig. 6. Restored scale of ditto. Fig. 7. Scale of *P. Sussexiensis*. Fig. 8. Longitudinal section of *Pinus Pinaster*. Fig. 9. Scale of *Zamia Yatesii*, seen from above. Fig. 10. Ditto, seen from the side.

Fig. 11. Cone of *Sequoiites Woodwardii.* Fig. 12. Restored cone of ditto. Fig. 13. Ovules of ditto, with the leaves broken off (double the natural size). Fig. 14. A single ovule magnified. Fig. 15 and 16. The two kinds of foliage.

PLATE LX.—Fig. 1. Cone of *Araucarites sphærocarpus*, two-thirds the natural size. (The original is preserved in the British Museum, and is from the Inferior Oolite, Bruton, Somersetshire.) Fig. 2. A scale of *A. Bidwilli*, somewhat reduced, showing the upper small scale. Fig. 3. Scale from the apex of the fossil cone. Fig. 4. Scale from the corresponding portion of the cone of *A. Bidwilli.* Fig. 5. A portion of the fossil cone, natural size, showing the single interior seed-cavity. Fig. 6. A section of the scale of *A. Bidwilli.*

DESCRIPTION OF A NEW SEMPERVIVUM, FROM THE SALVAGE ISLANDS.

By THE BARON DO CASTELLO DE PAIVA,

Professor of Botany in the Polytechnic Academy of Porto, Member of the Royal Academy of Sciences of Lisbon, of the Zoological Society of London, etc. etc.

(*Communicated by the* Rev. R. T. LOWE, M.A.)

SEMPERVIVUM LOWEI, *Paiva, n. sp.*

Calyx 7-partitus, laciniis oblongo-lanceolatis lutescenti-carneis, intus lineis tribus rubris longitudinalibus læte ornatis, extus fere irroratis, pilosis. Petala septem, oblongo-lanceolata, fere spathuliformia, acuminata, lutescenti-carnea, pellucida, quasi irrorata, intus linea 1 rubra longitudinali picta, calycis laciniis alterna, marginibus serratis. Stamina quatuordecim, seriebus duabus æqualibus concentricis disposita; 7 externa petalorum unguibus inserta, æqualia, filamentis lutescentibus cylindraceis, petala non æquantibus, apice antheras oblongas intense rubras ferentibus. Pistillum: ovarium 7-loculare, turgidum, capselliforme, fasciis 7 nigrescentibus longitudinalibus notatum; styli 7 luteoli, lanceolati, apice stigmata 7 linearia ferentes; nectaria 7, ovarium ambientia, magna, crassissima, luteo-virescentia, lucida, semilunaria. Flores paniculati s. ad umbellam simplicem dispositi, inæquales, è rosetta quinquefoliosa exeuntes; pedunculi cylindracei, rubelli, valde pilosi, apice subclavati. Folia ovoidea, crassissima, sessilia, interne depressiuscula, imbricatim disposita, luteo-viridentia. Planta perennis, procumbens, stolonifera, stolonibus plurimis longis cylindricis albidis nec radicantibus, maculis longitudinalibus rufescentibus notatis, omnibus ex radicis collo circulariter exeuntibus, apice s. ad extremum folia floresque sustinentibus.

HAB. Haud rara ad rupium fissuras, etiam in aridis maritimis insulæ *Selvagem grande* dictæ. Floret Februario, Martio.

OBS. Pulcherrima species. Habitu externo a congeneribus valde distincta.

In honorem clariss. Rev. R. T. Lowe, floræ et faunæ Oceani Atlantici insularum perscrutatoris insignis, necnon exactissimi descriptoris grato animo amice dedicavi.

[I have not seen at present specimens of the above plant, but, relying implicitly on the accuracy of the foregoing elegant and excellent description, I have no doubt of its being perfectly distinct from every other Madeiran, Canarian, or Cape Verde species hitherto recorded. It seems to be allied to *Sedum cæruleum*, Vahl (Sims in Bot. Mag. t. 2224), and may perhaps eventually prove to be better placed in *Sedum* than in *Sempervivum*.—R. T. L.]

EXRAPHIDIAN CHARACTER OF WOLFFIA.

BY GEORGE GULLIVER, F.R.S.

In the last number of the 'Journal of Botany' I have indicated that a further examination of *Wolffia* would be interesting.

Had Sir William Jackson Hooker, and other eminent botanists who regarded *Wolffia arrhiza* as nothing but the young state of *Lemna minor*, compared the cells of these two species, this error might have been avoided; for, besides the difference between the cells of the epidermis, so well depicted by Hoffmann, I have shown, by an engraving, in the number of this Journal for last December, that while the raphides of *Lemna minor* are obvious and abundant, *Wolffia arrhiza* is destitute of them; and since that sketch of these plants was printed, I have found that the raphidian character is easily seen, under an achromatic object-glass of half an inch focal length, even in the smallest young fronds of *Lemna minor*, so that this diagnostic character is likely to prove always available and useful.

Now *Wolffia Brasiliensis*, like *W. arrhiza*, proves also to be an exraphidian plant; and thus these two species agree well with each other, and both alike differ as remarkably from *Lemna minor*.

In this single point of view, *Wolffia* approaches more nearly than *Lemna* to Acotyledons. I have in vain searched many of our Ferns, Mosses, and their allies, for the raphides which I have found in all the British species of *Lemna* and in the exotic *Pistia*. But our knowledge of

the distribution of raphides in the vegetable kingdom is not yet sufficiently precise and extensive to give much significance to such isolated facts; and it should be borne in mind that I restrict the term raphides, as more particularly described in the 'Popular Science Review,' vol. iv. p. 576–7, to the bundles of acicular forms occurring in cells, which forms are not mere crystals, but constitute with their cells a true organic structure.

The examinations now made of *W. Brasiliensis* have been confined to three or four old dried fronds from Weddell himself, and for which I am indebted to the courtesy of a friend.

Edenbridge, December 7th, 1866.

ON THE EUPHORBIACEOUS GENUS CAPELLENIA, *T. et B.*

MM. Teijsmann and Binnendyk have described and figured a new genus of the Natural Order *Euphorbiaceæ* in the 'Natuurkundige Tydschrift voor Nederlandsch India,' Deel xxix. p. 236, *et seq.*, which they called in honour of Baronet van der Capellen, the founder and protector of the botanical gardens at Buitenzorg, in Java. This genus proves, however, to be identical with *Endospermum*, Benth., in Fl. Hongkong. p. 304. This is now a third species of that genus, which must bear the name of *Endospermum Moluccana*, being different from *E. Malaccense* and *E. Sinense* by the peltate leaves, etc.

J. Kurz.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We have been obliged to defer the publication of abstracts of some important papers, read before the Association, at its meeting at Nottingham in August last. We give the following now, and hope to complete our report in an early number.

On Insular Floras: a Lecture. By Dr. J. D. Hooker.

Confining his attention to what are more properly designated *oceanic islets*, Dr. Hooker pointed out that these are invariably volcanic, mountainous, and very small in comparison to the immensity of the oceans that surround them. His attention was early directed to them from his having accompanied Sir James Ross's Antarctic expedition,

which originated at the British Association meeting of 1838, at Newcastle, and which circumnavigated the globe, visiting many oceanic islets, making magnetical observations in these, and prosecuting geographical discovery in high southern latitudes.

In illustration of this subject, Dr. Hooker exhibited Colonel Sir H. James's ten-foot projection of two-thirds of the sphere on a plane, which gave, in their approximately true positions, the islets he chose as illustrations of his subject, and the continents to which their floras were related. These islands were Madeira, the Canaries, Azores, and St. Helena, in the Atlantic, and Kerguelen's Land, in the South Indian Ocean.

The Madeiran flora he described as being composed of two elements, the one clearly allied to that of the shores of the Mediterranean, the other totally different, and allied to none other but what was found in the Canaries and Azores, and which he designated "The Atlantic Element." The European (Mediterranean) element he classified into groups of plants which showed a graduated passage from those identical with Mediterranean species to those very different generically, but still always allied to Mediterranean plants,—the steps being—1. Identical species; 2. Varieties (obscurely marked and well marked); 3. Distinct species of Mediterranean genera, which were subdivided into obscurely-marked species (ranked by some as varieties), well-marked representative species, and very distinct species; and 4. Distinct genera, which may be grouped into similar subdivisions.

He next proceeded to show that there was a certain amount of parallelism between the commonest of the plants composing the Mediterranean element and those most divergent from the Mediterranean flora, the species identical with Mediterranean plants being much more numerous and abundant, the distinct genera being fewest and most rare in individuals.

In comparing the Madeira group, viz. Madeira, Porto Santo, and the Dezertas, the floras of the several islets were next shown to differ materially from one another, in varieties, species, and even genera, much in the same way as the flora of the whole group differed from the Mediterranean.

The Madeira mountains contain no alpine plants, and few representatives of the plants of higher northern latitudes.

Comparing Madeira with Great Britain, or any continental area of

equal extent and similar superficies, Dr. Hooker showed how extremely different its flora was, whether as regards the peculiarity of its genera and species and varieties, or their distribution over the group.

Commenting upon the peculiarities of the flora, Dr. Hooker selected the rare, peculiar, and isolated forms, as the most suggestive of speculations, in which no intelligent man could resist indulging,—whether, for instance, these are original creations, or have originated by variation operating through countless ages; and whether they are newly developed forms, likely to increase and multiply, or very old forms dying out. He showed that the latter was the most probable, on various independent considerations, and suggested, as a principal cause, subsidences of the land. Subsidence acts by contracting the area, and by intensifying the struggle for existence, but chiefly by reducing the number of insects which are the fertilizing agents, and especially the winged kinds, which are almost exclusively operative; adding that Mr. Wollaston had proved that in Madeira winged insects existed in wonderfully smaller proportion than wingless, as contrasted with the continent of Europe,—a conclusion that Dr. Hooker extended to other oceanic islets that he had visited. With regard to Madeira, however, man had been a more destructive agent than subsidence, for the island was, when discovered, so densely wooded that the settlers set fire to the forest, and the fire raged seven years, no doubt exterminating many species, and reducing the number of others proportionately. In the case of Porto Santo, rabbits had proved even more destructive, having at one time put a stop to cultivation, and fairly driven the settlers out of the island.

The flora of the Canaries was next briefly sketched, and it was shown how analogous it was in all its main features to that of Madeira, and how different from the flora of Africa, to which the Canaries are adjacent.

The Salvages rocks required special notice. They had been visited recently by a very able botanist, the Rev. R. T. Lowe, who informed Dr. Hooker that the plants were chiefly of the Canarian type, but partly Madeiran. Considering their very small size and isolated position, this fact suggested that the Salvages are the mountain tops of a much larger tract of land that once occupied a conspicuous position between the Canaries and Madeira.

The Azores are the third group of North Atlantic islets, and though situated 740 miles from Europe, and 500 from Madeira, their flora

was shown to be almost precisely of the same nature as the Madeiran and Canarian. They exhibited a relationship with America, but a curiously feeble relationship, considering that both the prevailing winds and currents set from the westward, and that seeds of West Indian plants were cast up abundantly on the shores of the islands. Of these none had established themselves on the islands, though several specimens of one of them picked up on the Azores had germinated at Kew.

The interesting islet of St. Helena was described at length, and the successive steps by which it had been reduced from a densely-wooded to an almost utterly barren condition.

When discovered 360 years ago, it was covered with forests, but owing to the introduction of goats in 1513, these forests have been almost exterminated. In 1709, the native ebony still existed in such abundance that it was used to burn lime with, whereas now it is entirely extinct; and in 1810 fuel had become so scarce, that coal had to be imported at an annual cost of £2729. 7*s*. 8*d*. Shortly after this, Major-General Beatson killed the goats, and commenced the introduction of trees from Europe, Africa, and Australia, which have spread rapidly, and now prevent the indigenous vegetation from resuming its sway. The only good collection of its native plants was made previous to this by Dr. Burchell, from which it appears that of the indigenous species, about forty-five in number, forty are absolutely peculiar to the island, and show that the affinity of the flora is chiefly with South Africa.

Kerguelen's Land, or Desolation Island of Captain Cook, was next described. Though in the latitude of Cornwall, its climate is most inclement, and its vegetation extremely scanty. It is 2170 miles from the nearest continent (Africa), and 4130 from South America. It contains only eighteen flowering plants, of which two are very peculiar, and found nowhere else, almost all the rest being natives of Tierra del Fuego. Of the indigenous species, the Kerguelen's Land Cabbage is the most interesting, from its remarkable form and habit, and its anti-scorbutic properties.

Dr. Hooker then proceeded to discuss the various theories that had been propounded, to explain the presence of the continental plants in the oceanic islets, and to account for the features of the floras. Two theories had been proposed, neither of which satisfied all the con-

ditions, though they agreed on two most important points. These were—1. That the continental plants were not *separately* created on the continent and islets, but passed from one to the other. 2. That insular floras were more ancient than those of continents. This last proposition was proved by the Atlantic plants of Madeira, the Canaries, and Azores, belonging to genera, and perhaps species, that existed in Europe during the Tertiary period, but which have since then become extinct on that continent.

The first hypothesis is that of the late Professor Edward Forbes, who supposed that the continents once stretched across the ocean, so as to include the islands, which were thus peopled with plants by intermediate land which has since disappeared. This hypothesis was propounded at the Cambridge meeting of the British Association in 1845, and, having been amply discussed there and elsewhere, the lecturer did not deem it necessary to recapitulate the arguments in favour of it.

The other hypothesis, that the plants had been carried by birds or the elements from the continents to the islands, had long been held as a supposition, but never developed scientifically till Mr. Darwin did so in his 'Origin of Species.' Mr. Darwin's principal arguments are:—That all naturalists admit such transport to exist, however limited in degree; that birds do carry seed, etc., and that Madeira and the Azores are stocked with European birds; that birds annually pass from America to Europe, and from Europe to Greenland; that as fish devour seeds, and birds fish, the birds may thus carry the seeds to distant islands; that dust is blown across the Atlantic, and that many seeds are no larger than particles of dust; that many seeds will bear long immersion in salt water without losing their vitality, and are often transported by marine currents; and that coral islets are confessedly thus peopled with plants, however far from land. Of negative evidence, Mr. Darwin adduces—That oceanic islands are poor in species; that whole Orders of plants are absent from them; that land mammals and batrachians are not to be found in oceanic islets, but that winged mammals, birds, and insects are found in all; and that if continental extension is granted to one island, it must be to all, which is inconsistent with probability, and with the fact that so many are volcanic. Lastly, Mr. Darwin shows how many facts and phenomena of insular floras may be explained by assuming the hypothesis of trans-

oceanic migration, and applying to it the theory of variation and natural selection.

The lecturer then pointed out the difficulties in the way of accepting this hypothesis of trans-oceanic migration, as accounting for all the insular floras, of which the chief are,—that these floras are not of a character intermediate between those of the continents between which the islets are placed, or scarcely at all so, but are characteristic of one continent only; that the Azores have scarcely a single American plant; that Kerguelen's Land has the flora of the continent most distant from it, and this no less than 4000 miles off; that it is extremely difficult to account by trans-oceanic migration, without intermediate land, for the peculiar non-European plants of Madeira being common to itself and the Canaries and Azores; that to aid the transport of plants from continents to islands, Mr. Darwin does assume probable former intermediate islands, and, if islands be thus granted, why not continents; that such large islands as are near continents and contain land mammals have, in Mr. Darwin's opinion, been peopled by previous continental extension; and that it is difficult to draw an arbitrary line between large contiguous and more distant smaller islets; that islands, as a rule, diminish in size with their distance from continents; that there are large areas in the Malayan archipelago exposed to great oscillations of level, which, if partially submerged, would leave only the tops of their volcanic mountains exposed, greatly resembling oceanic islets; that in such a case as that of Madeira, the Canaries, and Azores, it should follow that the more distant the island from the continent the more peculiar the species, which is hardly the case; lastly, that in many cases the most prevalent continental species are not found to be transported to any distance, as is the case in New Zealand, which does contain certain Australian plants, but not one of the genera of *Acacia* or *Eucalyptus*, though these form the staple of the Australian forests, and when introduced by man into New Zealand increase rapidly, to the extinction of the native vegetation.

On the whole, however, the lecturer was disposed to abandon the theory of continental extension, both because it had no solid basis and because it proved too much, accounting, as it were, for everything, and explaining nothing; and to accept the hypothesis of trans-oceanic migration, both because of its being an undoubted *vera causa* to a great extent, and because, as Mr. Darwin had shown, it did, with the

help of natural selection and variation, explain very many of the most obscure and interesting phenomena that oceanic island floras present. For instance, we may thus explain the persistence of ancient types in the islands that had succumbed in the struggle for existence on the continents; the representation of continental genera and species by similar, but not identical, genera and species in the several islets of each group; the graduated series of forms ascending from varieties to genera that islands often present, and the absence of such sharp lines of distinction between them as prevail in continental floras; the absence of whole continental orders on islands; the fact of species being few in proportion to genera, and genera in proportion to orders, as compared with continental floras; the tendency in many genera to assume grotesque and arborescent forms, etc.

In concluding, the lecturer wound up as follows :—"And if so many of the phenomena of oceanic island floras are thus well explained by the theory of the derivative origin of species, and not at all by any other theory, surely this is a strong corroboration of that theory. Depend upon it, the slow but steady struggle for existence is taking advantage of every change of form and every change of circumstance to which plants, no less than animals, are exposed; and, that variation and changing of form is the rule in organic life is as certain as that definite combinations and mathematical proportions are the rule in the inorganic. By a wise ordinance it is ruled, that amongst living beings like shall never produce its exact like; that as no two circumstances in time or place are absolutely synchronous, or equal, or similar, so shall no two beings be born alike; that a variety in the environing conditions in which the progeny of a living being may be placed, shall be met by variety in the progeny itself. A wise ordinance it is, that ensures the succession of living beings, not by multiplying absolutely identical forms, but by varying them, so that the right form may fill its right place in nature's ever-varying economy.

"The acceptation of general principles, whether in the physical or biological sciences, has always been a slow process; and I look for no exception in the case of the derivative origin of species. The physical sciences, however, have in this matter the start of the biological: scientific progress in them having commenced several centuries ago, whereas it is hardly one century since botany and geology first became the subject of exact and scientific study. Before that time not a system

had been invented, and the principles of life, whether in their structural or functional aspects, have, for the most part, been discovered within the lifetime of many of us here, and the knowledge of them is not yet recognized as a branch of a liberal education.

"You have all read of uncivilized races, who regard every month's moon as a new creation of their gods; who, they say, eat up the old moons, not for their sustenance, but for their glory, and to prove to mortals that they can make new ones; and they regard your denial that their gods do monthly make new moons as equivalent to denying that they could do so if they would.

"It is not long since it was heldby most scientific men, and is so by some still, that species of plants and animals were (like the savages' moons) created in as many spots, and in as great numbers as they were first found in at their native places. To deny that species were thus created was, in many persons' opinion, regarded as equivalent to denying that they could be so created.

"And I have twice been present at the annual gatherings of tribes in such a state of advancement as the above, but after they had come into contact with the missionaries of the most enlightened nation of mankind. These missionaries attempted to teach them, amongst other matters, the true theory of the moon's motions; and at the first of these gatherings, when the subject was described by them, the presiding Sachem shook his head and his spear. The priests first attacked the new doctrine, and with fury; their temples were ornamented with symbols of the old creed; and their religious chants and rites were worded and arranged in accordance with it. The 'medicine men,' however, being divided amongst themselves (as medicine men are apt to be in all countries), some of them sided with the missionaries, many from spite to the priests, but a few, I could see, from conviction; and, putting my trust in the latter, I, for one, never doubted what the upshot would be.

"Upwards of six years elapsed before I again visited that country, and was present at another annual gathering of the same tribes; and I then found the presiding Sachem treating the missionaries' theory of the moon's motions as an accepted fact, and the people applauding his avowal of the new creed.

"Do you ask me what tribes these were, and where their annual gatherings were held, and when? I will tell you. The first was in

1860, when Mr. Darwin's derivative theory of species was first brought before the bar of a scientific assembly, and that the British Association at Oxford; and I need not tell those who heard our presiding Sachem's address last Wednesday that the second was at Nottingham."

NEW PUBLICATIONS.

Report of the Papers, Discussions, and General Proceedings of the British Association.—Nottingham Meeting, 1866. By WM. T. ROBERTSON, Esq., M.D. London: Hardwicke. Pp. 305.

The authoritative Transactions of the Association are never ready till the next meeting is about to be held, and then the interest of novelty is gone, and the volume is placed on the library shelf to be consulted as occasion requires. The newspapers of the day give reports of the meetings, but they are always so imperfect, and what is given is so full of error, that they are next to worthless for scientific purposes. The public want a record of what has been done, with authoritative abstracts of the papers, speedily after the rising of the Association. Such a volume is before us. Its publication has been delayed by the illness of its editor, Dr. Robertson, who was one of the Local Secretaries. We are surprised that with six weeks' interruption such an amount of editorial labour could have been so satisfactorily accomplished in so short a time. From the Editor's position he has obtained extensive assistance from the authors of the papers, and has consequently produced a really valuable and reliable volume. A history of Nottingham, an historical sketch of the Association, and short biographies of all its Presidents, are prefixed to the volume. It will be welcome to those who were at Nottingham as a trustworthy record of what they took part in, and will be valued by those who were not there as an accurate account of the work done at the meeting.

BOTANICAL NEWS.

Dr. Alexander Dickson, of Edinburgh, has been appointed to the Chair of Botany in Trinity College, Dublin, vacant by the death of Professor W. Harvey. Our readers are acquainted with Dr. Dickson's important contributions to vegetable morphology, some of which have been published in this Journal.

M. Th. Eulenstein (of Stuttgart), who has devoted many years to the investigation of the *Diatomaceæ*, and is now engaged on a second edition of the *Diatomeæ* in Pritchard's 'Infusoria,' has undertaken to publish a series of authentic and original specimens, with a view to facilitate the identification of the numerous species established by foreign authors. The uncertainty of nomenclature which has pervaded all writings subsequent to those of Ehrenberg and Kützing arises from a want of knowledge of their specimens, the greater proportion of which M. Eulenstein has obtained for the purpose of publication. Part I., containing Nos. 1 to 100, will consist chiefly of specimens selected from the herbarium of Professor Kützing, and will explain many critical species established by that author in his 'Bacillaria' and 'Species Algarum.' The subsequent parts will contain original specimens illustrating the works of Ehrenberg, Heiberg, Grunow, Rabenhorst, and others. Besides the numerous new and rare forms which will be found in this series, it will furnish systematists with a key to many species hitherto misunderstood, and so form an indispensable part of every scientific collection of Diatoms. The specimens are carefully prepared dry or in balsam, and neatly mounted on thin slides with ground edges, 3 in. by 1 in. The labels contain the original names with the localities, whilst a separate list of synonyms, with critical notes, will be published with Part V. The whole series is intended to consist of five parts, containing 100 specimens each. The price to subscribers is £4 for each part, but single parts cannot be supplied. In subscribing, a money-order for Part I., which will be sent out this month, may be added. The whole collection will appear during 1867. Simultaneously with this, a second series will be published with a view to furnish a standard collection of the types of the *Diatomaceæ*. This series will contain typical representatives of nearly all the known genera, recent and fossil. It will consist of five parts, each containing 100 specimens, and will be issued at the low price of £2 per part. A. Pritchard, Esq., 87, St. Paul's Road, Highbury, London, N., will give further information and receive subscriptions and money-orders for M. Eulenstein.

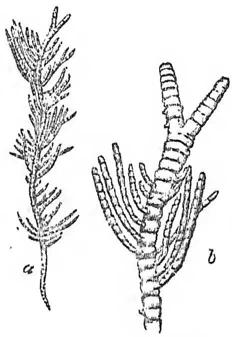
At the meeting of the Scottish Arboriculture Society, on the 7th of November last, Mr. J. G. Thomson, of Grantown, Inverness, reported that the Larch disease (*Adelgis Laricis*) had nearly left that part of the country, and that even the plants which had been affected some time ago were recovering, and this season had made healthy and vigorous growths. He said the weather this year seems to have been very favourable for the growth of plants, as he had seldom seen so much young wood made in one season before, while seed of every kind is most abundant.

LITHOTHRIX, A NEW GENUS OF CORALLINÆ.

By Dr. J. E. Gray, F.R.S., etc.

Lamarck and Lamouroux divided the Corallinæ into genera according to the form of the frond-joints. More recently, Decaisne and Harvey have characterized the genera by the form of the fruit, whether it was like an urn in shape or like a pustule with a central perforation.

Both these characters are good, and when studied together, as they are used by Areschoug and Agardh, they afford the means of dividing the species into very natural groups, but in most of these groups there are species which combine the characters in such a manner as to make it difficult to determine to which genus they are most nearly allied.



Lithothrix Aspergillum.
a. complete plant.
b. portion magnified.

The new form belongs to the group of genera having the fructification in the form of small pustules on the side of the frond, like *Amphiroa* of Areschoug, which contains the genera *Euamphiroa* and *Arthrocardia* of Kützing, *Amphiroa* of Lamouroux and Kützing, and *Eurytion* of Harvey.

The genus may be thus defined, and named Lithothrix. Frond pinnate; joints cylindrical, short, scarcely defined; upper joints rather compressed, two-edged; branches simple, cylindrical, pinnate or subverticillate, generally one from each of the two or four sides of the stem. *Ceramidia* pustuliform on the sides of the joints of the upper part of the stem, or of the joints of the lower part of the branches.

Lithothrix Aspergillum. Frond pinnate or subverticillate; branches simple, opposite or verticillate, cylindrical, indistinctly jointed; upper part of the stem compressed, broader, bearing the pustules on the sides; joints shorter than broad; nodes slightly indented.

Hab. Vancouver's Island, Dr. C. B. Wood, 1861.

This Coralline is very unlike any that I find described in the various essays on this group of Algæ. It was one of the interesting species found by Dr. C. B. Wood, in Vancouver's Island, in 1861, and sent to Sir W. Hooker for the Kew Herbarium. I have also a specimen from the same locality.

REVISION OF THE SECTION *TOMENTOSA* OF THE GENUS ROSA.

By A. Déséglise.*

If, in a series of species forming a natural group, one compares the first of the series with the last, it will certainly be found that they are easily distinguished; but if the first and second are compared, their resemblances will often appear more striking than their differences. One ought not, however, on this account, to unite them, for, if this be done, the third must be united to the second, and so on to the last of the series; and this reunion of all the species into one, though appearing absurd, would however be only logical. Differences in individuals are at once explained by differences of locality and of age, but such a superficial examination does not admit of a satisfactory comparison of the forms upon which a number of species have been established.

The species of the section *Tomentosa* are met with almost everywhere, and numerous specimens exist in all herbariums of any size, but, when one ventures to distinguish them, the difficulty experienced arises no doubt to some extent from the close affinity of the forms, but much more from the imperfection and obscurity of their diagnoses.

If the modern school has been reproached for hastily establishing species often on a single difference, the same reproach may be as forcibly applied to the 'lumpers,' who ignore, without examination, their differences. To know even a little of what is around us, one must perseveringly and methodically examine the very objects themselves, for nature is a better guide than man. Whatever opinion be held in regard to species, one must thoroughly study the natural forms; they must be analysed, described, and classified, and science will eventually give them their true rank.

Section *Tomentosa*, Déségl. Naturalist (1865), vol. i. p. 313.—*Villosæ*, Besser, Enum. Fl. Volhyniæ, etc., p. 60. *Caninæ* (pars), Seringe in DC. Prod. vol. ii. p. 611. *Diastylæ* trib. *Orthoacanthæ*, Godet, Fl. Jura, p. 204.

1. *Rosa vestita*, Godet, Fl. Jura, p. 210.
2. *R. Arduennensis*, Crépin, Notes sur Pl. rares et crit. de la

* Abstract of a paper from vol. xx. of the 'Mémoires de la Société Académique d'Angers,' with translations of the characters of the species found in Britain.

Belgique (1865), p. 30.—*R. mollissima*, *b*, Lejeune, Comp. Fl. Belg. ii. p. 142.

A lowly shrub, with a few equal, straight, compressed, and horizontal prickles rising from a basal disk; petioles pubescent, glandulose, prickly below or unarmed, each branch having the same characters; 5–7 leaflets, the lateral with petioles, the terminal somewhat cordate; leaflets elongated, oval-elliptic, rounded at the base, more or less attenuated at the summit, *almost glabrous on both surfaces, and covered both above and below with numerous resinous glands*, doubly dentate, with glandular serratures; stipules glabrous above, glandulose below, the points a little divergent; peduncles solitary or 2–4, hispid glandulose, with *very large* bracts, glabrous above, glandulose below, equal to or a little shorter than the peduncles; tube of calyx globular, glaucous green, hispid glandulose; segments terminating in a foliaceous appendage, more or less denticulate, 2 entire, 3 pinnatifid, glandulose below, equal to the corolla, erect after flowering; style hairy; disk very short; the large corolla of a *bright rose* colour; fruit globular, *orange-red*, crowned by the connivent persistent segments of the calyx.

May. Hedges and thickets. Hedges at Thirsk, York (*Baker*). Belgium.

3. *R. cuspidata*, M. Bieb. Fl. Taur. Cauc. i. p. 396.—*R. Seringeana*, Godr. Fl. Lorr. ed. ii. vol. ii. p. 255. *R. tomentosa*, Woods, Linn. Trans. xii. p. 197;—Wirtgen, n. 344; Baker, Herb. Ros. Brit. n. 9.

A lowly branching shrub, with strongish, whitish, scattered prickles, those on the stem dilated at the base, slightly curved at the apex, on the young branches rounded at the base and horizontal; petioles *hairy glandulose*, prickly; 5–7 leaflets, the laterals petiolate, the terminal rounded at the base, more or less elongated-acute at the summit; the leaflets rather large, *oval-lanceolate*, more or less obtuse and more or less attenuated at the apex, more or less pubescent below, *whitish, soft, hairy, and scattered over with small glands below*, doubly dentate with glandulose teeth; stipules pubescent above, pubescent and glandulose below, the upper ones dilated, the points acute, divergent; peduncles hispid, solitary or 3–10 in a corymb, with oval acuminate bracts at their base, which are pubescent, and the lower surface besides with scattered glands, equal to or surpassing the peduncles; tube of the calyx *ovoid, hispid;* segments of the calyx tomentose within, glandulose below, apical appendages 2 entire, 3 pinnatifid with linear lanceolate

divisions bordered with shining pedicellate glands, as long as the corolla, reflexed, at length erect and caducous; styles brush-like; disk plain; flowers *rose, afterwards whitish;* fruit *ovoid*, red.

June, July. Hedges and woods. Holywell, Northumberland. Cleveland, Thirsk, Thornton, Gersnire (the specimens from this locality have unarmed branches), Muller (Baker). France, Belgium.

4. *R. Tunoniensis*, Déségl. Herb. Ros. n. 36.

5. *R. omissa*, Déségl. Herb. Ros. n. 57.

6. *R. Annesiensis*, Déségl. Herb. Ros. n. 74.

7. *R. dimorpha*, Besser, Enum. Fl. Volh. p. 19. *R. mollis*, Swartz; —Billot, Exsicc. n. 1481.

8. *R. farinosa*, Bechst. Forstb. p. 243.

A somewhat high, branching shrub, prickles dilated at the base, straight, those on the branches weaker, not abundant; petioles whitish, tomentose, canaliculate, some minute glands scattered on the upper surface, prickly below; 5–7 leaflets, the lateral subsessile, the terminal oval with a long petiole; leaflets oval, oval-elliptic, tomentose, of a bright green, whitish above (the French specimens have the leaves without glands below and dentate, whilst those from England have scattered glands and are doubly dentate); stipules lanceolate, glabrous above, hairy below, ciliate, glandulose at the margin; points acute, divergent; peduncles solitary or 2–5, glabrous or pubescent, but not hispid; bracts oval-lanceolate, cuspidate at the apex, generally shorter than the peduncles, the corymbs with two large bracts at their base, the outer peduncles of the trifid cymes support the bracts; calyx-tube ovoid, glabrous; calyx-segments with oval appendages at the apex, tomentose within, almost glabrous and glandless below (the English specimens have the segments glandulose below), 2 entire, 3 pinnatifid, projecting in the bud, shorter than the corolla, reflexed at flowering; style free, hairy; disk plain; flowers pale rose; fruit . . . . (*fructus globoso-oviformis turgidus, obscure ruber*, Rau. Enum. p. 147).

June. Hedges. Perthshire. (Hailstone in Herb. Baker.) France.

9. *R. tomentosa*, Smith, Fl. Brit. ii. p. 539. *R. tomentosa, a. Smithiana*, Seringe, De Cand. Prod. ii. p. 618. *R. insidiosa*, Grenier, Fl. Jur. p. 233. *R. villosa, β*, Hudson, Fl. Angl. p. 219;—Ic. Eng. Bot. t. 990, mala;—Billot, Exsicc. n. 1662 and bis!; Wirtgen, Exsicc. n. 78, 232, 271; Baker, Herb. Ros. Brit. n. 8.

A tufted shrub with straight branches, prickles compressed at the

base, straight, horizontal; petioles tomentose, *above with some scattered, small, stipitate glands*, prickly below; 5–7 petiolate leaflets, the terminal more or less rounded at the base, *oval, elliptic, greyish, pubescent or tomentose on both surfaces, and without glands below*, doubly dentate, with glandular ciliated teeth; stipules lanceolate, glabrous above, pubescent below, fringed with glands, points acute, divergent; peduncles terminal, solitary or 2–4, hispid glandulose, with oval acuminate bracts at their base, glabrous above, *tomentose below*, and as long as the peduncles; calyx-tube *ovoid*, hispid; segments glandulose, spathulate at the apex, 2 entire, 3 pinnatifid, with appendages fringed with pedicellate glands, as long as the corolla, reflexed during flowering, not persistent; styles short, brush-like, or glabrous (*R. insidiosa*, Grenier), disk plain; flowers *bright rose;* fruit ovoid, more or less elongated, orange-red when ripe.

June, July. Hedges, thickets, and woods. Alston, Cumberland (Miss Unthank in Herb. Baker); Westmoreland (Watson); Heaton, Yorkshire (Baker); Northumberland (Baker). The specimens from this locality differ from our type, in having the stipules and bracts glabrous on both sides, the petioles are glandular and prickly, but not villose. I do not know the form of the fruit, my specimens having only unopened buds. France. Belgium.

In the 'Journal of Botany,' Vol. III. p. 10, I asked, "Does *Rosa tomentosa*, Sm., exist in France, or only in England? Do not the English botanists confound this species with others?" I have since been trying to clear up this matter, not only by the examination of published descriptions but also by observing the living plant, and examining numerous dried specimens. Mr. J. G. Baker has kindly helped me by examining the authentic herbaria in London, by comparing my types with the specimens there, and especially by supplying me with specimens of Woods's species, collected by himself. Unfortunately the examination of Smith's specimens does not throw any light on this intricate question, seeing he unites what nature separates.

Mr. J. G. Baker sends me the following information;—Smith's Herbarium contains, under the name of *R. tomentosa*, seven specimens:—

1st. "Ehrhart, arb. 45; *R. villosa*, L. Hanover (printed ticket), herb. Davall, 1802.

"Petioles covered with a soft down, glands numerous; terminal leaflet typically oval, grey, hairy on its upper surface; bracts hairy on

the back, and strongly glandulose all over; tube of the calyx straitly oval. I cannot see the under surface of the leaves."

2nd. "Switzerland, Schleicher.

"Leaves less hairy above than in No. 1, hairy and very glandulose over the whole under-surface; petioles coarsely glandular; the bracts are less hairy on the back, and the leaves less hairy above than No. 1; calyx the same."

3rd. "County of Nottingham, rather common. G. Jellow, 1824.

"Petioles very glandulose, and covered with numerous prickles; calyx-tube broader and shorter. This is, I think, your *Rosa cuspidata*, and resembles the plant named *tomentosa*, in Woods's Collection."

4th. "Saint Faith (Norwich), 1779."

5th. "Arminghall Wood, 25th June, 1801.

"Resemble No. 2."

6th. "County of Cambridge. Rev. — Holme, 1801.

"Leaves hairy above, strongly glandulose, and somewhat hairy beneath; bracts very glandulose on the back, and the prickles curved; calyx-tube oval. This specimen is quite different from the others, and resembles either *Jundzilliana* or an allied form.

7th. "Anglesea, 1802. Rev. H. Davies.

"Either your *tomentosa* or very near it! A few strong glands on the petiole and the under surface of the leaf; ripe fruit ovoid, and the calyx-segments are still persistent on one of the specimens.

"I may then say that the seven specimens represent five different forms; 2, 4, and 5 being the most common in England, and in English herbaria; none of them being exactly either your *tomentosa* or your *cuspidata*, but something intermediate between them." (J. G. Baker, Letter, 6th February, 1865.)

The seven specimens of Smith's Herbarium throw no light on this special question. Smith has taken for his type the rarest form, without troubling himself about the other species which might be included in *R. villosa*, L.; I am led to form this opinion from having received from Mr. Baker in 1865, *R. tomentosa*, from Westmoreland, such as it is known amongst the greater proportion of authors. It does not follow that because Nos. 2, 4, and 5 are, according to Mr. Baker, the most common forms in England, they should be united under Smith's species, rather than under any other; for the English specimens which I have received, under the name of *R. tomentosa*, are literally loaded with glands

on the under surface of the leaves, and certainly Smith would not have failed to notice this character in the diagnosis of his species, if his typical plant had shown it. No. 6 belongs to the *Rubiginosæ.* No. 1 being pasted down, it cannot be determined whether the leaves are glandulose beneath or not. No. 7 cannot be referred to *R. tomentosa.* The types in Smith's Herbarium being thus uncertain, the wiser plan will be to analyse the published descriptions; and this is the method we shall pursue in endeavouring to clear away the confusion which exists under the name of *R. tomentosa.*

Smith, Flora Brit. (1800) vol. ii. p. 539, says, "Foliola elliptico-ovata, utrinque mollissime tomentosa," and again in the Comp. Fl. Brit. (1816) p. 78, "Fructibus ovatis pedunculisque hispidis, aculeis caulinis aduncis, foliolis ovatis utrinque tomentosis." (All, or nearly all the Floras of France and Germany, describe Smith's plant as without glands on the under surface of the leaf.) Smith, in establishing his *R. tomentosa*, says, "Præcedente (*R. villosa*, L., which also has leaves without glands), omnibus partibus minor est, et habitu cum *R. canina* convenit, nisi quod folia undique pubescunt, et subcinerea videntur."

De Cand. Fl. Fr. vol. iii. p. 440 (1805), says, "Leaves covered with soft hairs, numerous and adpressed," and cites as a synonym Bauhin, Hist. Pl. vol. ii. p. 44, f. 2? The doubt is well founded, since Bauhin figures a plant with glabrous peduncles, calyx-tube, and calyx-segments.

Gmelin, Fl. Badensi-Alsatica (1806), vol. iv. p. 368, says, "Foliola septem, quinque subsessilia, ovalia, argute duplicato-serrata, utrinque pallide viridia, tomentoso-sericea," citing Eng. Bot. t. 990. This figure is very bad, as it only shows the upper part of a flowering branch, and the upper surface of the leaves, making them moreover simply dentate, whilst they are doubly dentate.

Lejeune, Fl. de Spa (1811), vol. i. p. 230, says, "Leaves cottony on both surfaces."

Mérat, Fl. des Environs de Paris (1812), p. 190; Bastard, Fl. de Maine et Loire (1809–12), say, "Leaves tomentose."

Woods, 'British Species of *Rosa*' (1816), p. 197, says of his *R. tomentosa*, "Foliola . . . utrinque tomentosa, duplicato-serrata, subtus nunc tota superficie, nunc margine, venisve tantum glandulosa." Woods must have had several different forms before him in describing his type; this is confirmed by consulting the herbarium prepared by him

as types of his species, and deposited in the Linnean Society's herbarium at London. The type of his species is represented in this collection by the Nos. 38 and 39; No. 38 is *R. cuspidata*, Bieb. (!), according to Mr. Baker. Whenever a description includes several doubtful forms of which the limits are unknown, the result must be that the most general characters are substituted in part for true specific characters, which would not be the case were the description based upon a single well-determined form. The synonyms cited by Woods are certainly full of confusion; indeed, under the circumstances, it could not be otherwise. The synonyms of Smith, Fl. Brit., Eng. Bot., De Cand. Fl. Fr., do not at all correspond with his description. It seems to us that when an author cites a synonym he ought to have a specimen of the plant before him, or at any rate to take the trouble to consult the original text. By this means we should avoid gross errors in synonymy. Woods ranks under his type fourteen varieties, which are represented by nineteen numbers in his herbarium. Nos. 44, 48, 51, and 58 are *R. tomentosa*, Baker (non Smith); No. 40, *R. scabriuscula*, Sm.; No. 41, *R. subcristata*, Baker (Sect. *Caninæ*); No. 42, *R. Sherardi*, Davies; Nos. 49 and 50, *R. Jundzilliana*, Baker, non Besser, (Sect. *Rubiginosæ*); No. 59, *R. canescens*, Baker (Sect. *Caninæ*).

Trattinick, Monogr. Ros. (1823) i. p. 117, says, "Foliolis elliptico-ovatis, utrinque mollissime tomentosis, subcinerascentibus."

Smith, Engl. Fl. (1824) ii. p. 383, adds, "Leaves glandular below." The synonyms quoted contradict the description. Thus Fl. Brit. characterizes the species, "Foliis utrinque mollissime tomentosis;" and Lindley, "Leaves hoary with down, sometimes slightly glandular beneath, when bruised having a turpentine smell." As he makes *R. scabriuscula*, Sm., a variety of *R. tomentosa*, he was able to say that the leaves were sometimes glandular beneath; but his type *α. vera* is not less free from glands beneath than that plant is.

Villars, Fl. du Dauph. iii. p. 551, says, "The leaves from 5 to 7 are large, more or less pointed, hairy on both sides. Bauhin, Hist. Pl. ii. p. 44, f. *Good*." The figure is far from good, as has been already shown. Bauhin describes it, "Cui foliola quina, vel septena, subrotunda, rugosa, albicantia, hirsuta, non nihil odorata."

Duby, Bot. Gallicum (1828) i. p. 178, says, "Foliolis ovatis .... plus minus tomentosis;" of his variety *α*, the type of his *R. tomentosa*, he says, "Foliolis .... molliter tomentosis."

Host. Fl. Austr. (1831) ii. p. 21, "Foliola ovata, serrata, villosa, facie saturata, dorso pallide viridia."

Hooker, Br. Fl. (1835) p. 234, describes *R. scabriuscula*, Sm., as *R. tomentosa*, a very different species and much more common in England than *R. tomentosa*.

Petermann, Fl. Lips. (1838) p. 364, "Foliola 5–7, ovali-oblonga, cinerascenti-virentia, villosiusculo-pubescentia."

Gonnet, Fl. Élém. de la France (1847), p. 478, "Leaves ash-coloured, pubescent, cottony on both sides."

Kirschleger, Fl. d'Alsace (1852), i. p. 49, "This species is distinguished from *R. canina* by the generally soft tomentose greyish leaves, and by the straight horizontal and longish prickles; and from *R. pomifera* by its ovoid smaller (half the size), red, erect, somewhat hispid, cartilaginous fruits, and by the elliptic-oval, never elliptic-lanceolate leaflets."

Cosson and Germain, Fl. des Env. de Paris (1861), p. 221, "Leaves more or less ash-coloured on both sides, sometimes a little glandulose below, 5–7 leaflets."

Cariot, Ét. des Fleurs (1865), ii. p. 190, "Leaflets tomentose on both sides, without glands below."

I close my inquiry with these principal English, French, and German Floras. There is certainly confusion among English authors as to *R. tomentosa*. Smith probably established his species on a somewhat rare English form; then *R. scabriuscula*, Sm., became confounded with *R. tomentosa*, and these two species are united under the same name in books, and mixed in herbaria.

M. Grenier, Fl. du Jura (1864), p. 234, says that he retains the name *R. tomentosa* for this species, because the English specimens which he has are identical with the French plant. M. Grenier could not have examined n. 1662, collected by himself and distributed by the late M. Billot, because at that time he did not venture to say that the English specimens were the same as the French plant, seeing that the specimens collected at that time, at Besançon, are far from having, as M. Grenier says (l. c.) "leaves covered with minute glands below;" n. 1662 having the leaves only tomentose and without glands. M. Grenier may take this view, but he must permit us to inquire how far it corresponds with the descriptions. M. Grenier quotes also Eng. Bot. t. 990, for his *R. tomentosa*, but this, which is simply

dentate, is opposed to his text, where he says, "leaves doubly dentate."

The herbarium of Smith presenting the same confusion as subsequent describers of *R. tomentosa*, we must examine the descriptions of Fl. Brit., without taking the subsequent errors into account, for all, or at least the majority of botanists describe this plant in accordance with the characters given in 1800, and which have since been confirmed by De Candolle in 1805, Gmelin in 1806, Persoon in 1807, Trattinick in 1823, Reichenbach in 1830, and Boreau in 1849.

If *R. tomentosa* is as variable as *R. canina*, as some maintain, who object to raise to the position of species those pretended forms, which they hold must in time be reduced to their original species, then it is surprising that these pretended forms have retained their peculiarities for more than half a century, as must be obvious to every one who observes without preconceived notions. We believe that every constant variety among plants should be considered a species.

If further study and deeper research prove that the *R. tomentosa* of the French Floras is not that of Smith, I willingly accept Mr. Baker's name (*R. Dilleniana*, Baker in litt.) for our species, but, in the meantime, I must adhere to Smith's name.

Mr. Baker writes that he refers to our *R. tomentosa*, Buddle's specimen in Herb. Sloane, cxxvi. p. 22, named R. sylvestris, folio molliter hirsuto, fructu rotundo glabro, calyce et pedunculo hispidis, Ray, Synops. ed. iii. p. 478. Its round fruit cannot belong to this species, the fruit of which is oval. Smith, with good reason, refers the species in Ray to *R. Sherardi*, Dav.

Mr. Baker writes me that *R. heterophylla*, Woods, l. c. p. 195, and Herb. n. 34 and 35, seems to him a luxuriant state of *R. tomentosa*, and that *R. pulchella*, Woods, l. c. p. 196, and Herb. n. 36, is a variable mountain form of the same species.

10. *R. cinerascens*, Dumort. Fl. Belg. p. 93.

11. *R. scabriuscula*, Winch, Bot. Guide, p. 5; Woods, Trans. Linn. Soc. xii. p. 194, and Herb. n. 31 and 33; Engl. Bot. t. 1896 (teste Baker).

Shrub, with the bark of the young branches purple; prickles thin, sparse, dilated at the base, straight, unequal, often in pairs below the petioles; petioles tomentose, glandulose, prickly below; 5–7 leaflets,

the lateral subsessile, the terminal with a long petiole, rounded at the base, more or less acute at the summit, leaflets oval or elliptic-oblong, soft, tomentose above, tomentose and glandulose below, doubly dentate, the principal teeth ending in a mucro, the secondary in a gland; stipules lanceolate, glabrous above, hairy and glandulose below, fringed with glands, points divergent; peduncles solitary or 2–4, hispid, glandulose, with largish oval bracts, cuspidate at the summit, glabrous above, pubescent and glandulose below, shorter than the peduncles; tube of the calyx . . . (receptaculum ellipticum, nunc setis aliquot fortioribus quam quæ in pedunculo munitum, nunc glaberrimum, Woods, l. c.); calyx-segments with appendages often denticulate, glandulose below, 2 entire, 3 pinnatifid, with short filiform appendages, styles with hairy stigmas; disk plain; flowers . . . (flores concavi; petala alba, maculis sanguineis gemmæ persistentibus, Woods, l. c.); fruit large, ellipsoid, red, glabrous, crowned by the connivent and persistent reflexed calyx-segments.

England: Thirsk, and Sowerby, Northumberland, Durham, Leicester, Suffolk, Worcester, Kent, Somerset. Wicklow (Baker).

12. *R. Sherardi*, Davies and Smith, Engl. Fl. iv. 269.—*R. subglobosa*, Sm. l. c. ii. p. 384. *R. tomentosa*, var. ε, Woods, l. c. p. 201, and Herb. n. 43. *R. sylvestris, folio molliter hirsuto, fructu rotundo glabro, calyce et pedunculo hispidis*, Ray, Synops. ed. 3, p. 478;—Billot, Exs. n. 1481 bis!; Wirtgen, Exs. n. 233; Déségl. Herb. Ros. n. 37.

Shrub a little elevated, tufted, branching; branches lax, spinose; prickles unequal, more or less strong, compressed, straight or a little curved; petioles tomentose, with some minute glands, prickly below; 5–7 leaflets, all petiolate, the terminal rounded at the base, leaflets *oval acute* or *rounded, pubescent above, greyish tomentose below*, doubly dentate, with glandulose teeth; stipules lanceolate, glabrous above, pubescent below, fringed with glandulose cilia, points diverging; peduncles solitary or in a corymb, hispid glandulose, with oval cuspidate bracts, glabrous above, *pubescent below*, fringed with glandulose cilia, generally shorter than the peduncles; calyx-tube *nearly globular, contracted at the summit*, hispid, calyx-segments spathulate at the apex, glandular below, 2 entire, 3 pinnatifid, with short appendages, ciliated or bordered with pedicellate glands, shorter than the corolla, somewhat patent under the fruit, at length reflexed and caducous; styles with

hairy stigma, disk nearly plain; flowers *rose, afterwards becoming pale*; fruit *subglobose*, hispid, of an orange red.

This species differs from *R. tomentosa* in its oval-acute leaflets, the nearly globular calyx-tube, and subglobose fruit; and from *R. cuspidata* in its bracts and leaves being without glands below, the globular calyx-tube, and the subglobose orange-red fruit.

June, July. Hedges and woods. Kingston-on-Thames; Cambridgeshire; Angelsea. France. Rhenish Prussia. Belgium.

13. *R. Andrzeiowskii*, Steven in Besser, l. c. p. 19 and 66;—Baker, Herb. Ros. Brit. n. 10.

Tufted, branching shrub, with *strong* prickles, compressed at the enlarged base, nearly straight; petioles tomentose, with minute glands and small setaceous prickles; 5–7 leaflets, *elliptical roundish or oval*, pubescent on both surfaces, with a short, glossy villosity, doubly dentate with glandulose teeth, all petiolate, the terminal rounded or slightly cordate at the base; stipules glabrous above, pubescent and scattered over with minute glands below, glandulose at the margin, points divergent; peduncles generally 3–9 in a corymb, short, hispid glandulose, with oval, lanceolate glands, pubescent above, tomentose and scattered over with minute glands below, fringed with glands, shorter than the peduncles; calyx-tube ovoid, hispid glandulose; calyx-segments spathulate, glandulose below, 2 entire, 3 pinnatifid, with lanceolate appendages a little denticulate, fringed with glands, spreading in flowering, then reflexed persistent; styles with hairy stigmas, disk plain; flowers rose; fruit somewhat globular, hairy, red, *crowned* by the calyx-segments.

This species differs from *R. Sherardi* in its strong prickles, the scattered glands on the under surface of the leaves and stipules, the oval-lanceolate bracts with minute glands below, the ovoid calyx-tube, and the fruit crowned with the calyx-segments.

June. Woods and hedges. Sowerby, Thirsk (Baker); Forcett (Hailstone); Devonshire, valley of the Plym (Archer Briggs). France. Belgium.

14. *R. mollissima*, Fries, Summa Veg. Scand. p. 174 (non Willd. nec Gmel.); Baker, Rev. of Brit. Roses, p. 11?—*R. ciliato-petala*, Koch, Syn. p. 253 (non Besser). *R. villosa*, Woods, l. c. p. 189, and Herb. n. 25 and 30. *R. Andrzeiowskii*, Boreau (non Besser); Syme, Eng. Bot. ed. iii. t. 466;—Baker, Herb. Ros. Brit. n. 5? and n. 6?*

* One of the two authentic specimens in Buddle's herbarium (Herb. Sloane,

Shrub little elevated; branches violet or of an ashy-green, prickly, dilated at the base, nearly straight, in pairs under the branches, those of the stem somewhat strong, of the branches feeble and slender; petioles *tomentose-glandulose*, prickly below; 5–7 nearly sessile leaflets, the terminal a little rounded at the base, *oval-elliptic*, slightly pubescent on both surfaces, doubly dentate with glandulose teeth; stipules glabrous above, pubescent and with scattered glands below, fringed with glands, points short, divergent; peduncles hispid, short, with oval acuminate bracts, glabrous above, pubescent below, fringed with glands, longer than the peduncles; calyx-tube *ovoid or subglobose*, hispid; calyx-segments hairy below, tomentose in the interior, oval, terminated by a foliaceous or slightly denticulate point, 2 entire, 3 pinnatifid with short appendages, nearly equal to the corolla, reflexed at flowering, afterwards erect; styles with hairy stigmas; disk short; flowers rose; petals ciliated; fruit large, globular, hairy, brownish-red, crowned with the erect persistent calyx-segments, becoming fleshy at the base.

This species differs from *R. cuspidata* in its leaves being free from glands on their under surface, and in its globular fruit crowned with the calyx-segments. It differs from *R. tomentosa* in the soft pubescence of both sides of the leaves, the ciliate petals, and the globular fruit. It differs from *R. Sherardi* in its oval-elliptic leaflets, and its brownish-red fruit crowned with the persistent calyx-segments; and from *R. Andrzeiowskii*, in its ciliate petals, its larger fruit of a different colour, and its oval elliptic leaflets.

June. Woods and hedges. Banks of Loch Earn, Perthshire (Hailstone). Middleton, Derbyshire (Purchass); Northumberland and Yorkshire (Baker). France. Switzerland.

Var. *β. cærulea*, Woods, l. c. p. 192;—Baker, Herb. Ros. Brit. n. 7. Differs from the type in the peduncles and calyx-tube being smooth, and the leaves scattered over with glands below. North Yorkshire, Cumberland, Northumberland (Baker).

Var. *δ. suberecta*, Woods, l. c. p. 192. *R. mollis, β. resinosa*, Lindl. Stipules very glandulose below; petioles a little hairy, but covered with unequal prickles; leaves a little hairy below, very glandulose; calyx-tube very prickly; bracts red (Baker in litt.).

cxxvi. fol. 22) "of Rosa sylvestris, folio molliter hirsuto, fructu rotundo glabro, calyce et pedunculo hispidis," Ray, ed. iii. p. 478, belongs to this species, the other to *R. tomentosa*, Déségl. (teste Mr. J. G. Baker).

Obs. Mr. Baker has distributed in his Herb. Ros. Brit. n. 5 and 6, under the name of *R. mollissima*, Fries, a plant differing from that of Fries in its leaves being glandulose below.

(*To be concluded in next Number.*)

ERIOPHORUM ALPINUM, *Linn.*, AND *ACORUS CALAMUS*, *Linn.*, FOUND IN IRELAND.

Dr. Moore, at the meeting of the Natural History Society of Dublin, December 6th, 1866, showed specimens of *Eriophorum alpinum*, L., which had been found growing in considerable abundance on the north margin of Gurthavabra Lake, three miles west of Millstreet, county Cork, last October, by H. J. Ryder, Esq. The specimens were sent to Dr. Moore by Mr. Sullivan, of the Queen's College, Cork, who received them from the discoverer, Mr. Ryder. Dr. Moore considered this the most interesting plant which has been added to the Irish flora for many years. Hitherto the only habitats known for it in the British Isles are two, both of which are in Scotland, one near Forfar, the other in Sutherlandshire. In the former it has disappeared, in consequence of the lakes being drained where it grew. The new Irish locality will, therefore, be looked on with much interest by British botanists. In Lapland and Norway it grows on low bogs and marshes, and in De Candolle's 'Botanicon Gallicum,' it is stated to grow *in paludosis Vosgesorum, Jurassi, Alpium*, etc. The county Cork station is, therefore, intermediate, though the most westerly in Europe. It is also found in North America. Dr. Moore also stated that another plant of nearly equal interest had been discovered during the present year in the north of Ireland, the Sweet Flag, *Acorus Calamus*, L. The discovery of this plant is due to Mr. Stewart, of Belfast, who has of late years investigated the plants in his neighbourhood with much ability and diligence. Dr. Moore had seen the plant last September growing in great profusion in the Lurgan Canal, between Lisburn and Moira, where Mr. Stewart discovered it. Its principal habitats in the British Isles are the counties of Norfolk and Suffolk, but Mr. W. Wilson, the learned muscologist, had pointed it out to Dr. Moore in September of last year, growing near Warrington, in Lancashire. It is one of the plants which have hitherto been supposed not to have crossed the Irish Channel in its geographical range of distribution.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

On the Ballast Floras of the Coasts of Durham and Northumberland. By John Hogg, Esq.

The author, in his account of the plants which have been imported with ballast by ships on the coast of Durham and Northumberland, limited himself to the seacoast, and more especially to the banks of the rivers Tees, Wear, and Tyne. Of the latter are the great ballast-deposits at Port Clarence and those at West Hartlepool, at East Hartlepool, and the embankment of the railway to the north of the latter town, the mounds of ballast at Seaham, at Sunderland, and near Wearmouth, as well as those at South and North Shields, and others along the Tyne nearer to Newcastle. The ballast of the localities specified is chiefly chalk with flints; and, consequently, a great number of plants which grow naturally in cretaceous formations is there found. But several Orders of plants that might be expected are wanting; for example, there are no *Orchideæ* nor *Ranunculaceæ*, nor has Mr. Hogg met with any *Saxifragæ*, *Sedums*, *Rubi*, or Roses.

The lists of the species found were divided into *two* heads, viz. 1. *Exotics*, or plants *foreign* to our island; and, 2. The *rarer indigenous*, or naturalized, species of Great Britain, which were rarely, if ever, seen in the before-named districts.

The list of exotic plants consists of 74 species, and of these 47 had been published by Mr. Winch in the Transactions of the Natural History Society of Newcastle-on-Tyne; 7 by Mr. Norman, and 10 by Mr. Lawson, in the same Transactions. The author adds the following 10 species, which had not been before recorded:—

Scolymus maculatus. North of Old Hartlepool.
Iberis umbellata. Port Clarence.
Astragalus sp. A beautiful species, probably from Spain or Portugal, found on the sides of the railway south of Seaton, where it has grown for many years, and perfects its seeds.
Blitum virgatum. West Hartlepool.
Galega officinalis.
Trifolium Michelianum, *Savi.* West Hartlepool.
Coronilla varia.
Calendula officinalis. Port Clarence.
Lepidium Draba. West Hartlepool.
Centaurea orientalis. West Hartlepool.

Besides these, several other species of *Umbelliferæ*, *Cruciferæ*, and *Compositæ* have been found, but the author has been unable to determine them, as they are poor specimens, not in flower, and often dwarf and puny in their growth.

The rare native or naturalized plants consist of 169 species, 32 of which were found by Mr. Winch, 5 by Mr. Storey, 35 by Mr. Norman, and 37 by Mr. Lawson,—all of which have been published in the Transactions referred to. The remaining 60 species are added by the author in his paper.

Three monstrous forms of *Trifolium repens* have been found in the district,—one by Dr. Johnston on Holy Island, which he thus describes in his 'Flora of Berwick,' vol. i. p. 162, "The flowers are supported on rather long stalks; the calyx has six leaf-like cut segments, while the style is dilated into a large ovate leaf, toothed on the margins;" the second, found by Mr. Norman at Seaham, in which the petals are changed into little leaves; and the third by the author at West Hartlepool, with the segments of the calyx terminating in leaves with strong ribs and teeth.

It was noticed that the more tender ballast plants flourish for two or three seasons, but are soon killed by the frost of a severe winter, or the cutting east winds in spring. Some species have been carried inland with ballast taken for the repair of railways; several plants,—such as *Antirrhinum Linaria*, *Anthyllis Vulneraria*, two species of *Diplotaxis*, some of *Melilotus* and other *Leguminosæ*, and some *Compositæ*,—that were rarely, if ever, seen before the railways were made, have been conveyed thus along the lines of railway, and so have now become established. The ordinary common species of the district have not as yet suffered any decrease or injury from the imported plants. It was also remarked that after the ballast had been deposited for a short time, *annuals* mostly spring up, but after two or three years they gave way to a variety of *perennials*, which succeeded them.

ON THE ZONES OF THE CONIFERÆ, FROM THE MEDITERRANEAN TO THE CREST OF THE MARITIME ALPS. By W. Moggridge, Esq.

Mr. Moggridge said:—In presenting a paper on the Zones of the *Coniferæ* from the Mediterranean to the crest of the Maritime Alps, it is my wish to confine myself to mere facts, leaving to others more

competent than myself the task of drawing conclusions therefrom, and of instituting comparisons with other observations in different parts of Europe.

The district from whence I have obtained those facts may be roughly described as extending from Mentone along the seacoast nearly to Bordighera, about ten miles W. to E., and thence some forty miles N., to the great watershed of the Maritime Alps.

The general course of the chief rivers is from N. to S., but there are many tributary streams which run substantially E. and W. It will thus be apparent that this district presents every variety of aspect.

The great forests are on the northern slopes, where they have more of moisture and less of sun than on the other aspects.

Of this tract the two-thirds nearest to the sea are mainly composed of Jurassic limestone, but include nearly everything from thence up to the most modern strata. Altered rocks and porphyry occur extensively in the northern third.

The range of the thermometer at different elevations is great. The winter of 1864–65 was severe; and while the lowest degree registered in the shade to the N. of my house at 36 min. above the sea was 30 deg. F., the instrument on the Granmondo, at an elevation of 45 deg. 25 min., went down to 10 deg.,* and this at a distance of less than seven miles in a direct line.

One fact somewhat bearing upon my subject may be mentioned, as a rule (not without exception) the several species of *Coniferæ* are gregarious until we arrive at the higher mountains; *e.g. P. maritima* and *P. halepensis* rarely intermingle. The species occurring in the colder regions do intermingle, as *A. Larix* and *P. sylvestris*. Another observation, not perhaps quite so cognate, I may be allowed to mention, viz. the great sensitiveness of *P. halepensis*. When the morning is warm and sunny, its leaves are fully expanded; if the sky becomes overcast, they close partially; the sirocco produces a similar but more marked effect; but in rain the leaves are completely closed, giving the tree a most melancholy aspect.

The limits assigned in the following table indicate the heights above the sea at which the several species occur, and cease to appear *in any*

* This, the greatest cold of that winter, occurred between March 17th and February 10th, up to which time the lowest marked was 14 deg. The thermometers had been carefully compared.

abundance; a few scattered specimens may exist (frequently dwarfed or stunted) below or above.

Pinus Pinea	0 to 1046
P. maritima	0 to 4143
P. halepensis	0 to 2760
P. sylvestris	1000 to 5100
P. Cembra	4500 to 5000
Abies excelsa	1800 to 3100
A. pectinata	1900 to 3600
A. Larix	3500 to 5500
Juniperus communis . .	0 to 6300
J. phœnicea	0 to 4000
Cupressus sempervirens .	0 to 2300

It results from the above table that the Larch and the Scotch Fir are found at a greater elevation than the Cembra; but while the latter has a N.E. aspect, the two former are in situations where they enjoy a greater amount of sunshine.

It also appears that the humble Juniper may claim to be the king of the *Coniferæ* in the northern hemisphere, since they all pass in review before him. Indeed, that claim is strengthened, when we consider that this plant extends S. to N. from the Mediterranean to the North Cape, and forms a belt E. and W. encircling the pole, broken only by the intervention of water.

In conclusion, I would beg to say that if any points on which more information is required, or suggestions as to observations, should occur to my auditors, I should esteem it a favour if they would communicate with me, as I hope to have many a ramble during the ensuing winter in those glorious forests of the Alpes Maritimes.

Notes of a Botanical Tour to the Islands of Arran, County Galway. By Dr. E. Percival Wright.

Dr. Wright first enumerated the species actually collected, and then mentioned those plants that were remarkable or rare, or that had not been recorded from district vi. of the 'Cybele Hibernica.' Among these he alluded to *Aquilegia vulgaris*, found on the northern part of the large island; *Helianthemum canum*, *Sedum Rhodiola*, *Gentiana verna*, of which nothing but the leaves remained; *Solanum Dulcamara*, *Marrubium vulgare*, *Allium Babingtonii*, found on all the islands, and

very widely scattered over the large islands; *Adiantum Capillus-Veneris*, etc. Several common plants, such as *Sisymbrium officinale, Cochlearia officinalis, Torilis nodosa*, etc., were mentioned simply to supply the deficiency in this respect in the 'Cybele.' On the exposed western side of the island many ordinarily-met-with plants were remarkable for their peculiar stunted growth. Thus, the Samphire, which grew in the greatest abundance, was found in full flower, and yet hundreds of the plants were not more than 3 inches in height, and plants of *Sedum Rhodiola* were met with scarcely more than 2 inches in height. In all such cases the plants were growing in the chinks between the stones. A dwarfed condition of growth was not, however, by any means the rule, for under favourable conditions fronds of the Maidenhair Fern were found 20 inches in length. Several specimens of *Verbascum Thapsus* were met with nearly 5 feet high, and in one instance a cluster of that fine Thistle, *Silybum Marianum*, was seen, three or four of the flowering stalks of which were 5 feet 4 inches in height. Dr. Wright next proceeded to contrast the flora of the Arran Islands with that of the coast of Clare, referring to Mr. Foot's very interesting paper on the Burren flora, in the Transactions of the Royal Irish Academy, for this purpose, and suggested that the general affinity of the flora was rather to the Clare than to the Galway coast. This would at first sight be expected, seeing that Arran is, geologically speaking, but an extension of Clare. Almost every plant met with on the islands is met with in the Burren district, and *vice versâ*, whereas many plants are met with in the Connemara district, which are not found either in Clare or Arran.

NEW PUBLICATIONS.

A List of the Flowering Plants, Ferns, and Mosses collected in the immediate neighbourhood of Andover. By C. B. Clarke.—Price Threepence. Calcutta: R. Dean, Calcutta Central Press Company, Limited, 5, Council House Street. 1866.

The title-page of this publication is copied in full above, as being not the least curious page of a book which contains sundry other pages and paragraphs, in themselves curious even to serio-comicality.

The amusement to a reader arises from an under-stratum of intense egotism, cropping out to the surface in unexpected localities, combined with the odd manner in which the author's own alleged facts either directly contradict his most emphatic assertions, or by fair process of reasoning can be shown utterly inconsistent therewith. And yet the work is not without its internal evidence of vigorous and independent thought in the writer, which some day may possibly give him a position in science, high enough to excuse the very dogmatic expression of opinions, occasionally much at variance with currently accepted notions, which his present knowledge of botany appears inadequate to support him in. Meantime, he must first learn to look with a little more respect upon the recorded experience of other workers in like fields, and abate a good deal of the present egotism which makes him—quite unconsciously, it may be—parade his individual knowledge and opinions, as being more sound and more trustworthy than the combined knowledge and balanced opinions of most other workers in the like field of botany taken together.

We know not whether any venders of cheap literature haunt the streets of Calcutta; and it is only by a play of fancy that we can hear some hawker of books crying aloud:—"Hindoos and Anglo-Indians! Here you may buy for the small charge of three pennies (say, half a quarter of a rupee), a 'List of Andover Plants, being a catalogue of the flowering plants and ferns observed by C. B. Clarke, within ten (nearly entirely within five) miles of Andover, during occasional visits from 1858 to 1865.' Andover, O men of my caste and of all other castes, is a small town of no particular importance, situate somewhere, thousands of miles distant from Calcutta, in our Imperial Sovereign's island Queendom of Britain. Far away though the little town of Andover is, and maybe never before heard of by you, the book of its flora is printed in our capital of Calcutta, published only in Calcutta, and bearing the name of no British publisher on its title-page. O men of my caste, or whatever caste you be, encourage the literature of India, by expending the eighth of a rupee in buying the List of Andover Plants. Believe me, it is worth more than the author prices it at."

Dropping the *badinage*, we will condense the author's own account of his district, which may serve to show that he has good notions as to what is appropriate and desirable information to give in connection

with a local list of plants. The 114 pages are clearly printed on good thick paper, and by way of suitable frontispiece is a small coloured map, "intended to assist in gaining a general idea of the physical geography of the neighbourhood of Andover." The general idea is given by a coloured line tracing out "the principal watersheds," and by distinguishing the surface into three leading characters, first, "the high grounds," represented to occupy about half of the surface, and of which "the larger portion is on a gravelly or clay-gravelly subsoil;" second, "the open undulating hills," or bare downs, where, apparently, the chalk is found immediately under the surface; third, "the valleys," or narrow strips along the courses of the streamlets, where "the gravels which accompany the courses of the streams in this district are strictly fluviatile, formed by the rivers themselves, partly directly from chalk flints, still more largely from the high-level gravels." The species are severally located in accordance with this tripartite division of the surface, as fluviatile, sylvan, or chalk plants.

The information thus epitomized here is expanded into a geological disquisition in the book. Enough is quoted to suggest that there is something not altogether consistent with the author's account of the surface soil and subsoil, so largely composed of clay and gravel, for the reader to be immediately after informed that "the list of Andover plants may be considered as the typical chalk flora of the south of England." It might be supposed that the clays and gravels would bear plants not at all typical of the chalk flora, to say nothing of the numerous weeds of cultivation, which the advanced views of the author rightly lead him to treat as alien introductions. Still, though the flora as a whole must be one of mixed character, and thus cannot quite properly be designated "the typical chalk flora," it does actually include a proportionately large number of those species which appear to have some special connection with chalk, while we miss some few others which are elsewhere associated with chalk, or are common to the chalks and the harder limestones; for example, among the *Orchideæ*, the *Ophrys apifera* and *Aceras anthropophora*, with other more rare kinds, have not been observed by our author within the five or ten miles radius from Andover.

Mr. Clarke takes Babington's 'Manual of British Botany' for his text book, and his readers are to understand that the Andover plants accord with the descriptions given in the text book. Where he finds

a difference, even a very trifling difference, in his specimens, the fact is intimated by some remark or description of his own. This is a judicious course in the writer of a very local Flora, more especially so when the writer is comparatively a tyro in botany, as we take to be the case here. We cannot see that his selection of the Manual for a text-book required the apologetic defence of some pages, which is introduced under the head of "The Standard of Reference Selected." His reasons for adapting his own list of Andover plants to that text-book are thus finally summed up :—

"Among manuals I have chosen Professor Babington's, as carrying the subdivision of forms further than any other popular English manual. This is a great advantage for local purposes, where the slightest differences are worthy of notice, and general principles of classification are not under consideration. Nothing is trivial in nature. We have learnt from Mr. Darwin that 'lumpers' have often [?] united plants separated by wide physiological differences, as *Habenaria bifolia* and *H. chlorantha*. Botanical triumphs have been chiefly won by minute correctness of observation, and often of details the value of which was unsuspected at the time. It is quite possible that an observer may do good work by making a very bad species; as if some one had formerly entered the pin-eyed and thumb-eyed Primroses as two different species. In this Andover list I have inserted every remark which has occurred to me, omitting no observation as trivial, and have never spent time in trying to discover that no one has made the same observation before. If the observation is not included in the description and remarks of Babington's Manual, I have often reprinted it from Smith or other authority."

Of course we dissent from the *bizarre* notion of any botanist doing "good work by making a very bad species." Be it observed, our author gives no explanation as to the kind of good likely to result from the folly of so making two very bad species, on variations in the comparative length of stamens and pistils. The fact of such differences might be just as well known, and much better announced, without making very bad species founded solely thereon. Florist cultivators of the *Auricula* and *Polyanthus* have long enough been familiar with the variation, and perfectly aware that the differences were not specific, but would reappear among plants raised from the seeds of one single root. Certainly, our present makers of bad species require no

encouragement from Calcutta or anywhere else; they get on quite fast enough, and heedlessly enough, without either whip or lure.

Neither can we recommend any tyro to adopt the egotism of printing his own observations or imagined discoveries off-hand, without taking any pains to ascertain whether they are things already on record or true novelties worthy of being placed on record for the use and benefit of other botanists. The useful fact to the botanical world is, not that Mr. Clarke saw and tells something unmentioned in Babington's Manual, but that Mr. Clarke detected something worthy of record and not already recorded in botanical books. Idle repetitions of matters sufficiently well known give inconvenient bulk without increase of value to the literature of science. In the case immediately before us, it cannot be doubted that the author of the Manual omitted many trivial matters for the sake of keeping his book within more convenient size, while assuredly he did not expect that the authors of comital or sectional Floras would feel themselves called upon to supply the unimportant omissions.

In defending his selection of a text book, Mr. Clarke takes occasion to supply one omission in the Manual, which rather comes home to the writer of this notice; and as it relates to a matter of considerable importance in the statistics of phyto-geography, an examination into the soundness of our author's views thereon may be worth the additional length it will give to the notice. Mr. Clarke virtually, almost literally, declares that his own individual experience in British botany constitutes a better measure of the comparative frequency of British plants than does the method adopted in the 'Cybele Britannica.' No doubt, a botanist is fully justified in proposing any other method which may appear preferable; and we should gladly accept one really more exact and certain. But it seems a considerable egotism in any single individual to suppose, and to announce to the botanical world, that his own personal experience, simply empirical and brief in years, is itself a better test of plant-frequency than one based on the combined records, printed and manuscript, of a hundred or more other botanists, writing about the plants of a hundred or more different tracts in Britain. Our author's own words must be quoted:—

"The 'Cybele Britannica' itself, the most elaborate and carefully prepared abstract of the kind, founded on unusually numerous observations, and corrected by great local experience on the part of the

compiler, always astonishes beginners. There are many plants placed in it in the first degree of commonness, which I have never seen, though I have walked about much in very varied parts of Britain. But it may be thought that though the results of numerical comparisons are not in detail absolutely correct, yet that the broad features must be true by the aid of the general doctrine of averages. Yet very often these results are absolutely false in their broadest features; and mainly for two reasons, which I will illustrate by two cases."

It would quadruple the length of our quotation if we reprinted his two cases, supposed to be illustrations. Suffice it to say, that they are wholly irrelevant, arising from the author's own mistake in not distinguishing between numerical summaries and floral comparisons,—between the sums total of many local lists added together and the species-differences between two of them placed in comparison, one with the other. The given problem is, how most nearly to ascertain the comparative frequency of species, those which most successfully or least successfully hold their places in the struggle for existence, under actual present conditions. The method adopted in the 'Cybele Britannica' is to consider the whole surface of Britain apportioned into 38 districts, and these again subdivided into 112 minor sections. Those species which have been ascertained to occur seemingly wild in all the 38 districts are taken to form the first class of generality, and then to rank in commonness among themselves according to the number of the 112 sections in which they are also known to occur. Hereafter it may become possible to apply a more rigorous test, while we much doubt that any more precise measure could be practically carried out at the present day.

That the results of such a method should "astonish beginners" is likely enough, because beginners usually form a rude and empirical estimate of frequency from very local observation, or very brief experience. It might reasonably be expected also that such results would not exactly accord with the personal experience of Mr. C. B. Clarke, or even with the individual experience of any other single botanist. But if a good botanist truly could "walk about much in very varied parts of Britain" and yet fail to find "many of the plants placed in the first degree of commonness," this sort of experience would well warrant much distrust of the method, and might even justify a declaration that the results so obtained "are absolutely false in their broadest features."

But we have before alluded to the odd manner in which Mr. Clarke's own facts sometimes contradict his own positive assertions; and it may be that the explanation is to be found there; the blindness and the falseness being in his own observations, not in the method so freely denounced in its results. The census scale in the 'Cybele Britannica' is found in volume iv. pages 234–273. The species placed in the first class of frequency, the first group in the series from commonest to rarest, amount to 120, which have been ascertained to occur in all the 38 chief districts, and varying in the minor sections from 99 to 76. That list of 120 species has been collated with the 'List of Andover Plants,' and our readers will perhaps feel some of the astonishment above attributed to "beginners" on being told that no less than 119 of them are actually enumerated by Mr. Clarke among the plants seen by himself in one single habitat, to wit, within five miles of Andover. The one species which is omitted from the Andover list, and thus remains to represent the "many" species which Mr. Clarke has failed to detect while "walking about much in very varied parts of Britain," is *Erica Tetralix*—neither rare nor inconspicuous. Evidently there is some considerable mistake, the facts being so utterly inconsistent with the positive assertion. Possibly Mr. Clarke wrote his strictures at Calcutta, without access to a copy of the 'Cybele Britannica,' and has thus fallen into error of statement through trusting to memory alone. We suggest the explanation, though scarcely holding it to be a sufficient excuse.

Another difficult and much debated problem in plant-geography also finds its solution from the pen of Mr. Clarke; namely, how to distinguish the indigenous from the introduced species in Britain,—how to eliminate those originally placed in Britain by natural agencies from those which have subsequently been introduced into the island by the hand of man. Our courageous author cuts the Gordian knot at once, and in the simplest *personal* manner. "All plants in this list," he writes, "not stated to be ballast plants, weeds of cultivation, or garden weeds, are to be understood as considered indigenous. By an 'indigenous plant' I mean a plant which I should expect to meet with if I were transported backwards to the period immediately before agriculture was commenced." Very simple this, and doubtless quite a satisfactory definition to the author himself. But how are Smith and Jones, English botanists seeing only the presently existent flora of Britain, to

find out which among the various plants they actually meet with are those which Mr. C. B. Clarke "should expect to meet with" under the impossible circumstances supposed? We can see, however, that a sound definition of "an indigenous plant" really underlies that comical egotism of the three I I I. No doubt, the plants already in this country before cultivation commenced were the truly indigenous flora of the island. But how are we to know these apart? It is to be feared that Mr. C. B. Clarke's hypothetical expectations will not prove the practical sieve wherein to separate those indigenous plants from the remainder of the mixed flora now found on the surface soil of Britain. The American *Mimulus luteus* is given as an indigenous plant of the Andover district,—surely by mistake? This plant could hardly have been expected to occur in Hampshire many centuries before the discovery of America.

One other instance of our author's own facts being amusingly inconsistent with his decidedly expressed convictions we are still tempted to introduce here. The fronds of Ferns are very variable in outline and division, and how to use them for good specific characters is a difficulty too familiar to fern-lovers. What will Mr. Newman or pteridologists in general say to the following averment that all of them have been looking the wrong way? "In this order," writes Mr. Clarke, "the barren fronds alone supply the pinnules in their normal form, those on the fruiting fronds being in reality degradations or arrested developments, and therefore eminently variable, as is evident not merely in *Lomaria*, but in such plants as *Lastræa Oreopteris*, *Lastræa Filix-mas*, *Athyrium Filix-fœmina*. Many of the difficulties which are met with in these genera arise from the undue amount of regard paid to the form of the pinnules on fruiting fronds."

Mr. Clarke's 'List of Andover Plants' supplies a curious commentary on his own text above quoted. The list includes twelve species, all certain as to the specific names, with the single exception here cited, namely, "658. *Lastræa cristata?* Sylvan, rare. Faccombe Wood. I have only found barren fronds of this plant." Now, if Mr. Clarke had found only "fruiting fronds," the doubt would have been quite consistent with the rule he inculcates in the paragraph quoted. But it seems that the only instance where he needs to apply the specific name interrogatively happens to be that one where he has met with "barren fronds" only. Likely enough, he has been puzzled by an example of *L. spinulosa* in a non-fruiting state.

The list of flowering plants and ferns for the Andover district of a hundred square miles runs up to 667. But this list is unduly augmented by including *Aconitum Napellus*, *Silene Armeria*, *Papaver somniferum*, *Œnothera biennis*, and other casual escapes, numbered among the more truly wild plants in regular series. Two other species, interrogatively named in the list, we may confidently discard, namely, *Gnaphalium luteo-album* and *Carex aquatilis*, while two others, similarly named, may readily be admitted, namely, *Rumex obtusifolius* and *Salix caprea*.

We regret that Mr. Clarke did not print the name of a London publisher on his title-page and send some copies for disposal by him. We are indebted to the Rev. W. W. Newbould for the sight of the work, and for the knowledge that it exists at all. Our notice of a local book has run to some length, but the subjects selected for comment are not unimportant in a general view.

H. C. W.

BOTANICAL NEWS.

Our readers will be glad to learn that Dr. Hooker is publishing in the current numbers of the 'Gardener's Chronicle,' his important lecture on "Insular Floras," delivered in August last, before the members of the British Association, at Nottingham, and of which we gave a lengthened summary in our last number.

Botanical Society of Edinburgh.—*13th December.*—Wm. Gorrie, Esq., Vice-President, in the chair. The following communications were read:—1. Notes of an Excursion with Pupils to Braemar in August, 1866. By Professor Balfour. 2. On the Reproductive Organs of Mosses. By Mr. Wm. Bell, Saharunpore. 3. On *Taxus baccata variegata* seedlings. By Alex. J. Adie, Esq. 4. On Abnormal Flowers in *Tropæolum majus*. By Dr. Alexander Dickson. Dr. Dickson exhibited four abnormal flowers of the common Indian Cress (*Tropæolum majus*), each presenting a supernumerary spur. On these he remarked that, in *Tropæolum*, the posterior part of the receptacle between the insertion of the petals and that of the stamens is dilated so as to form the spur which is so characteristic in the genus. The position of the spur in a line with the posterior sepal has led many botanists to consider it as a process of that sepal, but the fact of its being situated *within* the insertion of the petals is conclusive as to its receptacular origin. In the flowers exhibited, the supernumerary spur (as if to show its want of connection with any sepal) is placed exactly between a lateral sepal and one of the anterior sepals, sometimes on the one side of the flower and sometimes on the other. These additional spurs are precisely similar to the normal ones, except that they are a

little shorter. This abnormality, although at first sight seeming to indicate a pelorian tendency, is no approximation to regularity, from the fact of the extra spur being differently placed, with regard to the sepals, from the normal one. Mr. Sadler announced that Mr. R. G. Ramsay, Bridgend, Perth, had, last summer, collected *Polypodium calcareum* in considerable quantity about two miles west from Aberfeldy. This is the first time that this fern has been met with in Scotland in an apparently wild state. Specimens from Mr. Ramsay were exhibited and presented to the Herbarium.

January 10th, 1867.—William Gorrie, Esq., V.P., in the chair. Communications read:—1. On the *Glumaceæ* of Otago, New Zealand. By W. Lauder Lindsay, M.D., F.R.S.E., F.L.S. In this paper the author included the Natural Orders *Juncaceæ*, *Restiaceæ*, *Cyperaceæ*, and *Gramineæ*, and enumerated the different species he met with, and recorded the localities in which they occur. In speaking of the *Gramineæ* he says:—The grass lands of Otago are mainly confined to the plains or "flats," and the downs or uplands (under 1000 feet) of the lowlands; the hill ranges, with their valleys, between 1000 and 3000 feet; and the lake and river terraces of the interior. On the mountains immediately above the limits of arboreal and shrubby vegetation, the settler recognizes a belt of grassy vegetation, known as that of the "snow grasses." These consist only partially, however, of grasses proper (species of *Danthonia* and *Agrostis*), including, though to a very limited extent, probably certain *Cyperaceæ*. Buchanan is of opinion that some of the more fibrous grasses (species of *Triticum*, *Agrostis*, *Arundo*, and *Danthonia*) which abound on the lower hill ranges, at elevations over 1000 feet, might be used for making paper. But they cannot successfully compete with other paper materials which are more abundant and cheaper. They are rapidly disappearing before the introduced, cultivated, and so-called "artificial" grasses of Britain; they could only prove a permanent source of supply, therefore, if cultivated, and there are many indigenous fibrous plants, which are better than any of the grasses. In their present sites of growth, the cost of collection and transport would alone prevent competition in the market with rags or other material. Several grasses are recorded as indigenous by Dr. Hooker, which are also British; not a few British grasses have, undoubtedly, been introduced, and are now more or less extensively naturalized; while some are probably both indigenous and introduced. The problem here offers itself for solution to the local botanist, viz. whether, or how, it is possible to distinguish the native from the naturalized condition of the same species; for, on the one hand, grasses regarded by Dr. Hooker as introduced occur under circumstances in which it is, to say the least, extremely difficult to conceive of their being diffused from remote stations, while, on the other, those recorded as indigenous are found in localities which give rise to the legitimate conjecture that they have been introduced. For instance, two British species of *Festuca* occur in Otago, (*F. duriuscula* and *F. bromoides*). The former is recorded by Dr. Hooker as native, the latter as "certainly introduced and nowhere native." I found them growing in the same habitats, and intermixed; it was impossible to determine that the one was native and the other introduced. So far as regards their botanical characters, they appear identical with British specimens, and from their occur-

rence on the sheep and cattle runs of settlers were probably introduced rather than indigenous. Of *Festuca duriuscula*, I find it recorded in my field-book that my Otago specimens closely resemble forms of *F. ovina*, collected by myself at North Queensferry, Fifeshire, in June, 1859. But of *F. bromoides*, my Otago forms have less general resemblance to British specimens of that species than to those of *Bromus diandrus*. Again, *Kœleria cristata* is recorded in the Handbook Fl. (p. 335), as native, though Dr. Hooker adds, it is "probably introduced only." But in a letter [Jan. 31, 1865] he says, "I have increasing reasons for considering it introduced." Nevertheless, the plant occurs high on the Alps (4000 feet) of Canterbury and Otago, most remote from cultivation or settlements. *Poa annua* is regarded as introduced, but it was the most extensively distributed grass I met with in Otago, growing in a great variety of habitats, and in a corresponding multiplicity of conditions. *Phalaris canariensis* was gathered by Foster in 1772, being before the colonization of New Zealand (Otago was colonized so recently as 1847), but three years subsequent to Cook's first voyage (1769). It is difficult in such a case to understand how it came to be introduced, and yet it is included in Dr. Hooker's list of naturalized grasses. I found it growing in Otago apparently as wild as those British grasses, to be hereafter mentioned, which are considered truly indigenous. *Anthoxanthum odoratum* has been gathered at elevations of 3000 to 4000 feet on the glacier Mount Cook (13,000 feet high). It is extensively distributed throughout New Zealand, and it is one of the grasses I found growing in great profusion and luxuriance in several parts of Otago. Specimens indistinguishable as to size and general aspect from my Otago plant were collected by myself in 1850, on the meadows bordering the Elbe, Holstein. It is included, however, in Dr. Hooker's category of naturalized grasses, as is also *Bromus mollis*, which has been found on the Canterbury Alps at 4000 feet. On the other hand, the following are recorded by Dr. Hooker as native:—*Agrostis canina*, *Alopecurus geniculatus*, and *Deschampsia cæspitosa*. I do not think the problem is now capable of satisfactory solution in all cases. In certain cases there may be a strong probability that the plants were introduced, such as *Lolium perenne*, *Anthoxanthum odoratum*, or *Poa annua*, but I do not admit the conclusiveness of the evidence according to which certain British species of *Festuca*, *Agrostis*, *Alopecurus*, and *Deschampsia* are determined to be native, and those of *Kœleria*, *Phalaris*, *Bromus*, and *Festuca* to be merely naturalized. It is equally impossible to assert that the former are not native, or the latter also native; all that I hold is that, in the present stage of colonization,—in the present state of our knowledge of the botany of New Zealand,—proof of a sufficient or satisfactory kind to establish either one set of propositions or the other is probably impossible of attainment. 2. Notice of a species of *Trichoscypha*, and of a species of *Sarcocephalus* from Old Calabar, sent by the Rev. Alexander Robb. By Professor Balfour. Professor Balfour stated that the Rev. A. Robb, of Old Calabar, had sent some plants of interest from that district. One of these is *Trichoscypha Mannii* of Hook. fil. The fruit, however, had not been seen by Hooker, and was, therefore, omitted in the description. Mr. Robb had sent the fruit, which is a drupe about the size of a pigeon's egg, of an orange-red colour, and Professor Balfour has forwarded a specimen

to Kew, in order that the generic characters may be completed. In a letter to Dr. J. A. Smith, Mr. Robb says:—"I do not doubt that the plant described by Hooker is the same as this. It was at the Gaboon that the late Rev. John Baillie saw it. There he tasted the fruit, which the ladies of the American Mission preserved in sugar as a jam. He saw the trees near Creek Town, and was anxious to get the flower to send to Dr. Balfour. Gustav Mann was at the Gaboon, and no doubt he got the flowers there. The flower grows directly out of the stem, from near the root upwards, at intervals. The bunches of fruit are sometimes large. The flowering rachis is elongated to 2 or 3 feet, and covered with flowers. The plant is not common in Old Calabar. The natives have no name for it. At the Gaboon it is called *balola*." Another plant is a species of *Sarcocephalus*, and Professor Oliver, who is examining the West African flora, thinks it is *Sarcocephalus esculentus* Mr. Robb says that the colour of the styles is pure wax white, the most fairy-like things he ever saw. The smell of the flower is very fragrant. The tree grows in a curious articulated manner, like the bamboo. The mature fruit is of an apple shape and full of a pulpy substance, with numerous small seeds enclosed. It is edible, and called *peach* by the negroes. 3. Note on *Vellozia elegans*, from the Cape of Good Hope. By H. Fox Talbot, Esq. Communicated by Professor Balfour. Mr H. Fox Talbot transmitted to Dr. Balfour, some time ago, a flower and leaf of a plant which had been sent to him, which turns out to be a *Vellozia*, and Mr. Talbot proposed to have it ere long figured in the 'Botanical Magazine' under the name *Vellozia elegans*. Mr. Talbot has presented a living plant to the Edinburgh Royal Botanic Garden. 4. Remarks on a Substance called *Puttoo Manga*, found in the White Ant Nests in Travancore. By Dr. J. Shortt; transmitted by Dr. Alexander Hunter, Madras. The author remarks: —"Much interest has been excited of late about a substance found in the burrows of the white ant, and which is known by the Tamil name of *Puttoo Manga*, or white-ant mango. It is frequently found to exist among ant-hills in Travancore, the Western Coast, and Coimbatore. The first specimen sent home from this country was by Dr. Waring, who, on opening the centre room of his house at Travancore, for the purpose of building two walls, and digging to the depth of three feet below the surface, found several holes scooped out in the earth, perfectly smooth and circular, and of a sufficient size to admit a man's hand, and observed hanging down from the sides of these cavities several clusters of dark-coloured fruit-like looking bodies of various sizes and shapes. On exhibiting them to native practitioners, they eagerly took possession of the greater number, calling them *Puttoo Manga*. It appears that these are found, though rarely, under the foundations of old buildings, and that they are believed to be either formed or produced by white ants; they are in high repute, and greatly sought after, as medicinal substances. Such was the account that accompanied the only three specimens that were in possession of the Pharmaceutical Society of London, in 1860, and contributed by Dr. Waring." These specimens were submitted to the Rev. M. J. Berkeley, who pronounced them to be of a fungoid nature. This has since been confirmed by Messrs. Currie and Hanbury. The substance is known to the natives by the name of *Puttoo Rai*, or *Mail Manga*. It is common in the Malabar and Coimbatore districts

—one out of every fifteen or twenty ant-hills explored produced this growth; but it is not found in the Carnatic. This may be accounted for by the greater dryness of the climate in these parts, and the absence of that moisture and heat so necessary for fungoid growths. The natives state that it is occasionally met with in dark crevices, and in the recesses of rocks and caves; but my experience does not confirm the latter fact as yet. 5. On the Varieties of Variegated Greens, etc., as Ornamental Plants. By Mr. M'Nab. 6. Notice of the state of Open-Air Vegetation in the Royal Botanic Garden. By Mr. M'Nab.

LITERARY AND PHILOSOPHICAL SOCIETY OF MANCHESTER.—*Oct.* 8, 1866. —Mr. Hurst read a paper "On the Plants springing up spontaneously on the fresh turning-up of pasture land at Knutsford, Cheshire." He said that grass seeds were sown over a portion, but that this merely accelerated what appeared to be the certain effect of time in this district, viz. the almost total extinction of other plants by the grasses. His observations only extended through July and August, during which time he observed 58 species, of which the *Gramineæ* form 17 per cent.; *Polygonaceæ*, 13 per cent.; *Compositæ*, 11 per cent.; *Leguminosæ*, 9 per cent.; one-half of the species being comprised in four families. The author drew attention to the total absence of *Umbelliferæ*. Also *Polygonum Convolvulus* was the plant which at one time covered more ground than any other species, appearing to smother most of the plants around it. Yet in untouched adjacent fields not an individual could be found. Classed by De Candolle among the plants cultivated by man against his will in western Europe, and only indigenous in Siberia, it certainly seemed curious that a Siberian plant should be the first to cover the soil of Cheshire on its being exposed to the air. Mr. Hurst remarked that *Polygonum aviculare* came next in the extent of ground covered, and on flat unshaded places appeared to hold its own against *P. Convolvulus* better than any other plant; nor does it appear to be eventually smothered by the grasses among which it may frequently be found growing. *Papaver dubium* came next as to conspicuousness, though perhaps not covering so great an area as other species humbler in appearance. In the adjacent town of Bowdon, under similar circumstances, it sprang up abundantly the first year, sparingly the second, and almost disappeared the third,—the slightest cakeing or hardening of the surface soil being fatal to its existence. *Plantago major*, or "the footsteps of the white man," as it is called by the North American Indians, also appeared, but in small numbers.

Dec. 11, 1866.—"Notes on Varieties of *Sarothamnus scoparius*, Koch, and *Stachys Betonica*, Benth., from the Lizard, Cornwall." By Charles Bailey, Esq. I. *Sarothamnus scoparius*, Koch, var.—Mr. H. C. Watson admitted this species as a Cornish plant in the third volume of his 'Cybele Britannica.' The variety found differs from the normal form, here named var. *α*, in the following characters:—Var. *α. erecta*.—Stems erect, bushy; leaves stalked, the petioles as long as, or longer than, the leaflets; leaflets elliptical-obovate, bluntish. Var. *β. prostrata*.—Stems prostrate, spreading; leaves shortly stalked or sessile; leaflets ovate-acute, acuminate. The Cornish form, *β. prostrata*, differs from the normal plant chiefly in its habit of growth, which, instead of being erect and bushy, is remarkably prostrate, the branches spreading out in fan-shaped patches, and growing flat upon the ground; the branches, par-

ticularly in the upper half, are densely clothed with short spreading hairs; the leaves have shorter stalks, with a greater tendency to suppress the two lateral leaflets, the majority of the leaves, in fact, being unifoliate; the pods are less numerous, have their dorsal and ventral sutures covered with long silky hairs, and are black rather than brown, shorter, and have fewer seeds. The season was too far advanced for any flowers to be met with, either on Vellan Head or in the small valley running down from Jollytown—the only other locality in Cornwall where the plant was observed. II. *Stachys Betonica*, Bentham, var. Of this plant three well-marked forms have been described: *a*, *Betonica hirta*, Reich.; *b*, *B. serotina*, Host; and *c*, *B. stricta*, Ait.; and in many respects the form about to be described agrees with the first of these forms. In Prof. Babington's Manual (ed. v., p. 261) it is stated that "the English plant has the round crenate, not emarginate, lower lip of *B. hirta* (R.);" but Boreau is of opinion that, while the three forms just named preserve their remarkable differences of aspect when cultivated together, the distinctive characters furnished by the divisions of the corolla are but slightly constant. ('Flore du Centre de la France,' etc., ed. iii., vol. ii. p. 530.) The Cornish plant may be described as follows:—Stems decumbent, numerous, radiating from the rootstock, square above, rounded below, clothed with many short hairs, which are closely appressed in the upper part and pointing downwards, those in the lower part more spreading, but still much reflexed; spikes slightly inclined, just raised above the ground, compressed-globose, the verticils many-flowered, never distant; calyx covered with straight hairs, the sepals ending in stiff points; corolla three times longer than the calyx, the exterior covered with scattered shaggy hairs, which are long and silky at the base of the tube, but becoming shorter and more scattered as they approach the lip; opening of the mouth very wide, lower lip crenate, wavy; lower leaves on long stalks, cordate at the base, oblong, regularly crenate, glandular on the under surface, with short scattered hairs, upper leaves lanceolate on short stalks. Specimens of *B. hirta*, Reich., have not come under my notice, nor have I been able to meet with Reichenbach's diagnosis; but this form seems to agree very nearly with Boreau's description. Mr. Bentham, in his 'Labiatarum Genera et Species,' p. 532, gives, amongst the synonyms of his *Stachys Betonica*, "*Betonica hirta*, Leyss., Reichb. Icon. Bot. Eur. 8, p. 4, t. 711," which may be identical with *B. hirta*, Reich.; but the only reference to it which I have met with is in Dr. Garke's 'Flora von Nord- und Mittel-Deutschland,' where it is shortly described as "Var. *a*, *hirta*, Leyss.—Stem with short hairs, calyx rough-haired" (ed. vi., p. 318). The Cornish form is very plentiful on the cliffs of "Killas" rock, lying between Caerthilian and the Lizard Lights, growing with *Genista tinctoria*, L., var. *humifusa*, Dicks. which it much resembles in habit: it also occurs in other parts of south-western Cornwall, as at Cuddan Point, and the Mount's Bay district generally. Mr. Bailey gave a list of the more important plants with which he had met. This list contains two species not included in sub-province 1 of the first supplementary part to the 'Cybele Britannica,' viz. *Sinapis alba*, L., and *Lepigonum rupicola*, Bab.

Errata.—Page 7, line 9, *delete* "without locality;" ditto, line 10, *delete* "probably;" ditto, line 28, *for* "C. sphærica," *read* "*C. sphæricus;*" line 33, *for* "C. primæva," *read* "*C. primævus.*"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REPORT OF THE LONDON BOTANICAL EXCHANGE CLUB FOR THE YEAR 1866.

By the Curators.

(Plate LXI.)

[The Thirsk Natural History Society having been dissolved, the Botanical Exchange Club formerly connected with it is removed to London, the present Curators being J. G. Baker, Esq., and Dr. Henry Trimen.]

The following Report consists of short notes on some of the plants which have passed through our hands in making the distribution of the past year, interesting either from their critical importance, or from having been found in districts additional to those registered in the 'Cybele Britannica' and its Supplement.

Ranunculus Baudotii, Godr. Mr. Webb sends this from Wallasey, Cheshire; it is new to the Mersey sub-province.

Papaver Lecoqii, Lamot. Mr. Syme sends specimens from near Rochester, Kent.

Barbarea intermedia, Bor. Mr. Briggs contributes a specimen found at Egg Buckland, Devon, where, as usual, it grew in a clover field, and was probably sown with the crop.

Polygala ciliata, Lebel. The discoverer of this plant, Mr. Syme, sends a few specimens (as does also Mrs. Benson) from the Gogmagog Hills, Cambridgeshire, its only British locality known. In the new edition of 'English Botany,' it stands as a variety of *P. vulgaris*, from which it differs in its prostrate branches, in bearing stiff curled hairs on the pedicels and upper part of the stem, and more especially by the calyx-wings, bracts, crest of corolla, and capsules being minutely ciliate on their edges. It is also a more slender plant than *P. vulgaris*, thus approaching *P. depressa*.

Hypericum undulatum, Schousb. Mr. Briggs sends an example from Porth Curnow, near the Land's End, Cornwall. This is a more western station than any yet recorded.

Melilotus arvensis, Willd. A specimen from Crab Tree, Devon, communicated by Mr. Briggs. New to Devon. Possibly sown with grass or other seed.

Rosa inodora, Fries. It is desirable that the true *Rosa inodora* of

Fries should be looked for in Britain, as there are specimens in Borrer's and other herbaria gathered by Woods on the slope of Brean Down, in Somersetshire. From these specimens we take the following notes:—Prickles falcate, uniform. Leaves doubly serrated, rather hairy above, more so and densely glandular beneath, measuring about 3 inches from the base to the apex of the terminal leaflet, which is elliptical or obovate, narrowed to the base, and measures about 15 lines long by 9 broad. Petioles hairy and densely setose. Stipules and bracts glandular, and rather hairy on the back. Pedicel and gracefully ovate-urceolate calyx-tube quite naked. Sepals 8–9 lines long, naked on the back, with a long narrow point and two or three small linear gland-ciliated pinnæ on each side. The leaves in texture, shape, and glandulosity resemble those of *R. sepium*, not *R. canina*. From *R. sepium* it differs by its more robust habit, the larger size of all its parts, and the slight hairiness of its leaves, bracts, and stipules. The true *R. sepium*, so common in Central and Southern France, has not been found yet in Britain. The plant gathered by the Rev. W. T. Bree in Warwickshire resembles it in habit and dimensions, but has the upper half of the leaf not narrowed, the leaves slightly hairy on both sides and less glandular than in the true plant, the petiole hairy and but slightly setose, the stipules hairy and less glandular on the back, broader fruit, and hairy styles. This and the true *R. inodora* come very near to one another, and occupy a position about midway between *R. canina* and *R. rubiginosa*. It is probable, but not quite certain, that *R. inodora* is identical with *R. Klukii* of Besser, Wimmer, Boreau, and Déséglise,—a plant ranging from the west of France to the borders of Russia. *R. Borreri* of Woods (*R. inodora* of Hooker and Babington) differs from the true *R. inodora* of Fries by its much less glandular and more herbaceous leaves, which are rounded or even cordate at the base, slightly glandular petioles, bracts, and stipules, and more early-falling sepals.

Rosa bibracteata, Bastard. We give a description of this as it occurs in Britain:—Stems suberect, the prickles uniform, falcate. Leaves deep shining green on the upper surface, paler or subglaucous beneath, slightly hairy on the midrib only, the serration erecto-patent, rather irregular but not truly double, the petiole slightly hairy and furnished with 3 or 4 robust aciculi, the leaf measuring 3–4 inches from the base of the stipule to the tip of the terminal leaf, which is about $1\frac{1}{2}$

inch long by 1 inch broad, in shape broadly ovate, rounded at the base. Stipules narrow, the auricles acute, erecto-patent, gland-ciliated. Flowers 2–4 in a cluster, the peduncles 2–3 inches long, thinly setoso-glandular, the bracts ovate-lanceolate, naked on the back. Calyx-tube gracefully ovate-urceolate, naked, glaucous. Sepals about ½ inch long, some simple, the others with 1–2 small, linear, erecto-patent, gland-ciliated pinnæ on each side. Petals pure white. Column of styles ⅛ inch long, hairless. This has been found in Sussex and Cambridgeshire, and is about midway between *R. arvensis* and typical *R. systyla*.

Rosa systyla, Woods. Mr. Bromwich sends, from Warwick, specimens of this species which differ from the type in their white flowers and densely setose stems and peduncles.

Epilobium tetragonum, L. From Plymouth. Collected by Mr. Briggs. Additional to the Devon list of the 'Cybele.'

Epilobium Lamyi, F. Schultz. Mr. Baker distributes specimens of this plant grown from seeds from Dr. Wirtgen's Fasciculus. These specimens do not seem to differ in any material respect from *E. tetragonum;* the leaves, however, are not so perfectly strap-shaped, being broader at the base. There is no approach to *E. palustre*, between which and *E. tetragonum*, *E. Lamyi* has been said to be a hybrid.

Sedum purpureum, Tausch. Miss Gifford sends specimens gathered at Lynton, North Devon.

Galium erectum, Huds. Collected at Leek Wooton, Warwick, by Mr. Bromwich. New to the mid-Severn sub-province.

Apargia Taraxaci, Sm. Mr. Syme contributes a large plant, more than a foot high, and with a branched many-flowered stem, with which he writes "*Leontodon autumnalis*, var. *pratensis*. Cultivated from Braemar; originally a one-headed plant, 3 inches high, with black woolly heads."

Carduus nutanti-crispus. Mr. Baker gathered this on the Northumbrian flank of the Cheviots, near Wooller, growing with the ordinary forms of *C. nutans* and *C. crispus*, a single plant of an intermediate form much nearer the former than the latter. The stem was about 3 feet high, the leaves similar to those of *C. nutans*, but the spines rather feebler, the heads 3–5 in a cluster, mostly on distinct stalks but casually two close together, two-thirds the size of those of ordinary *C. nutans*, and the outer phyllaries not more than half as broad, and hardly

at all reflexed. This form is about midway between *C. nutans* and the Continental *C. acanthoides*, differing from *C. nutans* about as much the latter does from *C. crispus*.

Carduus crispus, L. Mr. Briggs sends a specimen from Yealmpton, with the remark—"very local and rare near Plymouth."

"*Carduus pseudo-Forsteri*." With specimens collected at Esher, Surrey, and thus named, Mr. Watson writes—"This luxuriant form of *C. pratensis* has been often misnamed *C. Forsteri* (*e.g.* by Sir W. J. Hooker, Mr. Mill, etc.)." It does not differ from the usual *C. pratensis*, except in size.

Cuscuta Trifolii, Bab. Mr. Briggs sends this from near Plymouth. It is not included in the Devon list in the 'Cybele.' One specimen is parasitical on *Trifolium hybridum*.

Mentha Pulegium, L. Mount Edgecumbe, Devon (Mr. Briggs). New to the Devon flora.

Galeopsis Ladanum, L., var. *canescens*. Mr. Briggs sends from the neighbourhood of Plymouth a *Galeopsis* which differs from the common British form of *G. Ladanum* (*G. angustifolia*, Ehrh.), by having the calyx, and in a less degree the stem and upper leaves, densely clothed with firm, erecto-patent, white woolly hairs. In this form the flower measures about 9 lines from the base of the calyx to the tip of the corolla, the calyx being not quite half of this, so that the corolla-tube considerably exceeds it. When the plant is in flower, the longest teeth are not more than $\frac{1}{8}$ inch long, about half of this being a mere cartilaginous awn. This is evidently the *G. canescens* of Boreau, and comes very near our specimens of *G. arvatica*, Jordan.

Mr. Syme sends the same plant from Pegwell, Kent, and the Rev. Mr. Newbould believes he has observed it in some parts of Cambridgeshire. It is probably a not uncommon plant.

Stachys ambigua, Sm. Mr. Syme contributes a specimen thus named, from "between Weymouth and Portland, near the bridge, Dorset." Examples named *Stachys palustri-sylvatica*, are sent from Devon (Mr. Briggs), Warwick (Mr. Bromwich), and Manchester (Dr. Windsor). These last-mentioned plants agree all with one another, and differ from Mr. Syme's in the form of the leaves. The leaves of the Dorset plant are oval or oblong, acute, slightly cordate at the base, coarsely and rather shallowly crenate-serrate. In *S. palustri-sylvatica* the leaves are oblong-ovate, ovate-lanceolate, or oblong-lanceolate,

acuminate, more or less cordate at the base, sharply serrate; the pubescence of the stem and leaves is much harsher than in *S. ambigua.*

Statice Limonium, L., var. *serotina*. Specimens thus named are sent by Mr. Syme from Northfleet, Kent. They differ from the ordinary plant in the broadly oval outline of the leaves, and in having a more branched stem, the lower ramifications of which are often sterile. This form will be probably found not uncommon.

Chenopodium urbicum, L., and *C. intermedium*, M. and K. Mr. Watson writes on these plants, of which he sends examples from near Chobham, Surrey, "Some Continental men refer to the figure in Eng. Bot. for *C. intermedium*, going on the toothing of the leaves—a most variable character in the *Chenopodia*. In these examples, the leaves are more triangular, the teeth smaller and not pointing so forward as represented in Eng. Bot. 717. There is a form in Surrey quite like the figure in Eng. Bot., which I have hitherto labelled *C. intermedium*. They are *slight* varieties only, and cannot be separated in any other way from Continental *C. urbicum*."

Chenopodium glaucum, L. Mr. Watson sends this from his garden (the seeds were from Guernsey, an unrecorded station for the plant). He writes, "probably few English botanists possess true examples." Mr. Lawson sends plants quite the same from the ballast-hills at Hartlepool, Durham.

Mercurialis ambigua, L. This monœcious state of *M. annua* is by no means uncommon about London and other large towns. Mr. Syme sends it from Stone, Kent, and Mr. Briggs from a garden (in which it had been cultivated) at Plymouth.

Salix ambigua, Ehrh. In the summer of the present year Mr. Baker noted on the slope of Dilston Fell, Tynedale, Northumberland, growing in small quantities amongst abundance of *S. aurita* and *S. repens*, a few bushes quite intermediate in the character of their leafy shoots. The three forms may be characterized as follows:—*S. aurita*. Stems chesnut, nearly naked; leaves $1\frac{1}{4}$ inches long, $\frac{5}{8}$ inch broad, obovate-oblong, herbaceous in texture, rugose and plicate, so that the point is quite twisted, the upper surface full-green and scarcely at all silky, the lower with all the veinlets raised, the intervals glaucous-green, with very fine short pubescence.

Intermediate. Stems grey and silky; leaves scarcely over 1 inch long, $\frac{5}{8}$ inch broad, oblong, herbaceous in texture, slightly rugose, the

point generally twisted, the upper surface grey-green, with a thin coating of fine silky hairs, the lower with only the main veinlets raised, clothed with a thicker coating of silvery silky down.

S. repens, L. Stems grey and silky; leaves $\frac{3}{4}$ inch long, under $\frac{3}{8}$ inch broad, elongate-oblong, subcoriaceous in texture, not at all rugose, the upper surface dark green when fresh, turning greyish when dried, with a very thin coating of silky down, the lower surface with only the main veins raised, all covered with a dense coating of silky silvery down.

This intermediate corresponds, so far as the specimens go, with the typical *S. ambigua* of the herbaria of Hooker and Borrer, with the plant figured as such in E. B. S., t. 2733, accepted as Ehrhart's plant by Dr. Anderssen, and issued in Herb. Norm. of Fries as the *S. aurito-repens* of Wimmer. In the character of the female catkin, *S. aurita*, *S. repens*, and this intermediate scarcely differ from one another. In all three it is generally not much above $\frac{1}{2}$ inch long by $\frac{1}{4}$ inch broad; the pedicel is quite half as long as the scale, and the style nearly obsolete. *S. aurita* and *S. repens* are both species that range over the horizontal extent of Britain and ascend the hills into the Inferarctic zone, growing very often intermixed; and *S. ambigua*, though a little known plant, has also an ascertained range from Sussex to the Orkneys. The β *major* of E. B. S. agrees with the *S. versifolia* of Seringe ('Saules de la Suisse,' No. 66!), and with Wimmer's *S. cinereo-repens*, as given by Fries. This differs from the *S. ambigua* already described by its larger obovate-oblong leaves, which are thinner in texture and hardly at all rugose, by its larger catkins and more prominent style. This was found by Mr. Borrer in Suffolk, and when brought into his garden grew into a bush 5 feet high; but the Northumbrian plant does not exceed 2 feet. Drummond's Forfar plant differs from this latter only by having the leaves more densely silky on both sides; and the form referred to *S. spathulata* of Willdenow differs only by its narrower leaves, which are three times as long as broad, narrowed gradually from the centre to both ends.

Spiranthes æstivalis, Rich. Mr. Hanbury contributes examples from Grande Mare, Guernsey, a new locality.

Leucoium vernum, L. A few flowers of this are sent by Mr. Watson. They were collected near Bridport, Dorset, by Mr. J. C. Mansel, who discovered the plant there in March, 1866. (See 'Journal of Botany,' vol. iv. p. 209, t. 49.)

Allium oleraceum, L. From Plymouth; collected by Mr. Briggs. Additional to the list of Devon species.

Wolffia arrhiza, Wimm. (*Lemna*, Linn.). Mr. Syme sends a plentiful supply of this recent addition to our flora from Staines, Middlesex. This pond and one at Walthamstow, Essex, are the only stations hitherto discovered in England for this little plant.

Potamogeton decipiens, Nolte. For the addition of this species to the British flora we are indebted to Mrs. Hopkins, of Bath, who has for several years recognized it as distinct, and now sends a supply of specimens (which unfortunately did not reach us before the parcels were sent out) from a canal in the neighbourhood of that city. From these the following description is taken:—Stem long, terete, copiously branched. Leaves uniform, all submerged, membranous, bright grass-green, sessile, oblong, 2–3 inches long, 1–1¼ inch broad, the edge not thickened or denticulate, the apex blunt with a slight mucro, the base also rounded; the midrib flattened with 3–6 fine longitudinal veins on each side of it, connected by fine regular transverse veinlets. Stipules ½–¾ inch long, not winged on the back. Peduncle considerably thicker than the stem, under 2 inches long, about equal in thickness throughout. Spike more than 1 inch long when fully developed. Lamina of the sepals nearly round. The plant comes very near to *P. lucens*, but in that the leaves are not so much rounded at each end, slightly stalked, and the border is thickened and minutely denticulate; the stipule is winged on the back on the lower part, and the peduncle is incrassated upwards. *P. prælongus* has leaves with a similar border to those of *P. decipiens*, but they are different in shape, much more lengthened out and hooded at the apex, and the peduncle is more slender and three or four times as long. *P. decipiens* is admirably figured in Reichenbach's 'Icones,' vol. vii. t. 35; and dried specimens have been issued in Reichenbach's Fl. Germ. Exsic. n. 1603, and the 'Herbarium Normale' of Fries. We have seen specimens also from Upsala, gathered by Dr. Andersson, and from Geneva, gathered by Dr. Lagger. Descriptions will be found in Reich. Ic. Fl. Germ., vol. vii. p. 22, and Koch's Syn. Fl. Germ., p. 779. None of the specimens we have examined have been in fruit, but, according to Hartman, it is similar to that of *P. lucens* (Skandinavens Flora, p. 214). In Northern Germany the plant has been gathered in Holstein, Schleswig, and the vicinity of Hamburg, but it is not included in the French floras.

Aira uliginosa, Weihe. This seems to have been gathered long ago by Mr. G. Don in the neighbourhood of Forfar, and by Mr. G. Jackson at the Loch of Drum, in Aberdeenshire, and should be looked for again on swampy moors. It is exceeding like *A. flexuosa*, with which it is united by Fries and Andersson; but it has been regarded as distinct by Koch and many other French and German authors. The characters principally relied upon to distinguish it are its more considerable ligule (oblong-acute in shape, in contradistinction to the very short truncate one of *A. flexuosa*), and the second flower of the spikelet, which in *A. flexuosa* is subsessile, having in the other a stalk half as long as itself. (See 'Journal of Botany,' vol. iv. p. 177.)

Lastrea dilatata, Presl., var. *lepidota*. This *Lastrea*, found near Aberdeen, and first brought into notice by Mr. Moore, is a well-marked form of the *spinulosa* series, with characters as follows:—Stem 4–6 inches long, densely clothed throughout with adpressed, spreading, or even recurved scales, which are very unequal in size, the small ones lanceolate, the largest ovate, 4½–6 lines long, 3 lines broad, nearly uniform in colour throughout. Frond not more that a foot long after it has been cultivated, 6–8 inches broad, ovate-deltoid in general outline, quadripinnatifid, the lower pinnæ decidedly the largest, and the pinnules of the lower side larger than those of the upper one, these latter lanceolate-deltoid, the lowest in large specimens 2 inches long by half as broad, cut down to the rhachis into stalked lanceolate segments, with distinct toothed or pinnatifid lobes. Colour dark green, the rhachis chesnut-brown on exposure; both the main one and those of the pinnæ considerably chaffy, the under surface slightly glandular, and the involucre a little gland-ciliated. From the typical plant this recedes considerably in the cutting and outline of the frond, being much more divided, with the lower pinnæ, as in *L. æmula*, conspicuously and uniformly the largest. This character, and the density and uniformity in colour of the scales, another point in which it resembles *L. æmula*, it retains in the root, which has been grown at Kew for several years.

The following species have been noticed in Middlesex by Dr. Trimen; they are additions to the flora of the North Thames subprovince of the 'Cybele Britannica:'—

Sagina ciliata, *Fr.*	Lepidium Smithii, *Hook.*
Vicia lathyroides, *L.*	Galium elongatum, *Presl.*
Epilobium obscurum, *Schreb.*	Hieracium murorum, *L.*
Epilobium tetragonum, *L.*	Triticum caninum, *uls.*

Exotic and Introduced Species.

Bunias orientalis, L. Waste ground, Shepherd's Bush. W. T. Dyer.

Alyssum calycinum, L. Waterbeach, Cambridge. F. A. Hanbury.

Malva parviflora, L. Meadows, Gloucester. G. O. St. Brody. (This is quite the same as a plant lately become frequent about London. It is larger and more erect than the *M. parviflora* of the Linnean Herbarium.)

Trifolium elegans, Savi? One root among sown *T. pratense*. Telegraph field, Claygate, Surrey. H. C. Watson; who sends also specimens of *T. hybridum*, from which *T. elegans* is scarcely distinct.

Vicia pannonica, Jacq., var. *purpurascens*, De Cand. Weed in a garden, Honicknowle, Devon. T. R. A. Briggs.

Potentilla hirta, L. Kew Green; subspontaneous. J. G. Baker.

Barkhausia fœtida, DC. Cornfield, Woodlass, Warwick. H. Bromwich.—Clover field, Chessington, Surrey. H. C. Watson.

Nicandra physaloides, Gærtn. Old brickfield, Margate, Kent. J. T. B. Syme.

Chenopodium ambrosioides, L. (*Ambrina*, Spach); *C. multifidum*, L. (*Roubiæva*, Moquin). Near Gloucester. G. O. St. Brody. (These two species, both apparently natives of the New World, are now widely-diffused weeds.)

Cynosurus echinatus, L. Clover-field near Hook, Surrey. H. C. Watson.

Bromus arvensis, L. The Parks, Oxford. H. Boswell.

J. G. Baker.
Henry Trimen.

Explanation of Plate LXI., representing *Potamogeton decipiens*, Nolte, from a specimen collected by Mrs. Hopkins in a canal near Bath. Fig. 1. Fragment of leaf magnified to show the characteristics of the edge, and the venation. Fig. 2. Flower magnified.

UTRICULARIA NEGLECTA, *Lehm.*

We have been shown a specimen of this plant in the herbarium of the British Museum, collected by the late Edward Forster in a gravel pit in Henhault Forest, Essex.

Professor Babington has noticed the species in all the editions of his Manual as likely to be found native in Britain, and his expectations are thus realized. He distinguishes it as follows:—"Spur adpressed, more slender, ovate-oblong, blunt or emarginate; upper corolla-lip nearly three times as long as the subrotund palate; peduncles four to five times as long as the bract, erect, with fruit; leaves more distant; bladders on both stems and leaves."

ON THE WORLD-DISTRIBUTION OF THE BRITISH FERNS.

By J. G. Baker, Esq., F.L.S.

The following Table has been compiled for the purpose of showing at one view a general outline of the distribution throughout the world of the British Ferns. As regards nomenclature and species-limitation, I have followed the 'Synopsis Filicum,' now in the press, commenced by Sir W. Hooker, of which one part was published before his death, and carried on by myself. I have not inserted a species for any district from which I have not myself seen a specimen. The districts adopted are as follows, viz.:—

Frigid Zone.

1. Within the Arctic Circle, all round the world.

Temperate Zone.

2. Temperate Europe and North Africa, including the Azores, Madeira, and Canaries.
3. Temperate Asia.
4. Temperate North America, exclusive of Mexico.
5. Temperate South Africa.
6. New Zealand and temperate Australia.
7. Temperate South America.

Torrid Zone.

8. Tropical Africa.
9. Tropical Asia and Polynesia.
10. Tropical America, including the whole of Mexico and Brazil.

			Temperate.						Torrid.		
1	Woodsia Ilvensis	1	2	3	4						
2	W. hyperborea	1	2	3	4						
3	Hymenophyllum Tunbridgense		2			5	6	7	8	9	10
4	Trichomanes radicans		2	3	4				8	9	10
5	Adiantum Capillus-Veneris		2	3	4	5			8	9	10
6	Cystopteris fragilis	1	2	3	4	5	6	7	8	9	10
7	C. montana	1	2	3							
8	Cryptogramme crispa	1	2	3	4						
9	Pteris aquilina	1	2	3	4	5	6		8	9	10
10	Lomaria Spicant	1	2	3	4						
11	Asplenium viride	1	2	3	4						
12	A. trichomanes		2	3	4	5	6			9	10
13	A. septentrionale		2	3	4						
14	A. marinum		2		4						10
15	A. Germanicum		2								
16	A. Ruta-muraria	1	2	3	4	5					
17	A. Adiantum-nigrum		2	3		5			8	9	
18	A. fontanum		2	3							10
19	A. lanceolatum		2						8		
20	A. Filix-fœmina	1	2	3	4	5		7	8	9	10
21	A. Ceterach		2	3							
22	Scolopendrium vulgare		2	3	4						
23	Aspidium Lonchitis	1	2	3	4						
24	A. aculeatum	1	2	3	4	5	6	7	8	9	10
25	Nephrodium Thelypteris		2	3	4	5	6		8		
26	N. montanum	1	2	3							
27	N. Filix-mas	1	2	3	4	5			8	9	10
28	N. cristatum		2		4						
29	N. rigidum		2	3	4						
30	N. spinulosum	1	2	3	4	5			8		
31	N. æmulum		2								
32	Polypodium Phegopteris	1	2	3	4						
33	P. Dryopteris	1	2	3	4						
34	P. vulgare	1	2	3	4	5					10
35	P. alpestre	1	2		4						
36	Gymnogramma leptophylla		2	3			6		8	9	10
37	Osmunda regalis		2	3	4	5			8	9	10
38	Ophioglossum vulgatum	1	2	3	4	5	6		8	9	10
39	O. Lusitanicum		2	3			6		8	9	
40	Botrychium Lunaria	1	2	3	4		6	7			
	Total	21	40	33	29	15	10	5	16	14	16

In addition to the forty species enumerated in this table, there are twenty-seven species found in Europe, which, with the exception perhaps of *Asplenium Petrarchæ* and *Botrychium rutaceum*, are not known in the British Isles. The following is a list of these species :—

Struthiopteris Germanica.
Woodsia glabella.
*Davallia Canariensis.
Cystopteris alpina.
C. Sudetica.
*Adiantum Æthiopicum.
Cheilanthes fragrans.
*C. Hispanica.
C. Szovitzii.
*Pteris longifolia.
*P. Cretica.
*P. arguta.
*Woodwardia radicans.
*Asplenium Hemionitis.
Asplenium Heufleri.
A. Petrarchæ.
A. Seelosii.
A. fissum.
A. crenulatum.
*Scolopendrium Hemionitis.
*Notochlæna lanuginosa.
N. Marantæ.
*Gymnogramma Pozoi.
Botrychium simplex.
B. ternatum.
B. virginicum.
B. rutaceum.

Those marked * are known only in the vicinity of the Mediterranean, but the others pass more or less distinctly into the interior of the Continent.

REVISION OF THE SECTION *TOMENTOSA* OF THE GENUS ROSA.

By A. Déséglise.

(*Concluded from page* 46.)

15. *Rosa resinosa*, Rchb. Fl. Excurs. ii. p. 616?; Bor. Fl. Cent. ed. 3, n. 885.—*R. coronata*, Crépin, Notes sur quelques Pl. rares ou critiq. de la Belgique, fasc. ii. p. 25. Wirtgen, Exs. n. 270; Déségl. Herb. Rosar. n. 75.

Tufted shrub with reddish bark; prickles unequal, slender, straight or a little curved; petioles *hairy glandulose*, with very small prickles; 5–7 petiolate leaflets, the terminal rounded at the base, leaflets *moderate sized, oval-elliptic, obtuse, greenish and softly hairy*, with a shining villosity above, *greyish hairy* below, *with the nerves prominent and covered with small resinous glands;* doubly dentate, the teeth very glandulose; stipules glabrous above, covered with glands below, the points a little obtuse at the summit, the upper ones dilated; peduncles short, solitary or 2–4, hairy glandulose, furnished at their base with acuminate bracts, glabrous above, glandulose below, equal to or surpassing the peduncles; calyx-tube *ovoid, hispid;* segments very glandulose, tomentose at the margins and in the interior, lanceolate, very

acuminate, 3 entire, 2 lobate; styles short, hairy; flowers small, of a *beautiful rose colour, yellowish in the centre;* fruit *round, red,* hairy, *crowned* with the patent connivent and persistent segments of the calyx.

This plant differs from *R. pomifera* in the leaflets being covered below with resinous glands, the tube of the calyx, and the smaller red fruit.

June, July. Mountainous underwoods. Westerdale, between Thirsk and Woodend, Yorkshire (*Baker*). France, Belgium.

Mr. J. G. Baker says (in litt. 13th April, 1865), regarding the plant distributed by Reichenbach as *Rosa resinosa*, n. 1271:—"I cannot at all distinguish it from *R. pomifera.* The petioles are very hairy, the ripe fruit is quite round, measuring fully an inch, tube of the calyx and peduncles very aciculate. Sepals always adhering to the ripe fruit. It resembles *R. pomifera*, Fries, Herb. Norm. fasc. ix. n. 47."

If the specimen distributed by Reichenbach resembles that published by Fries, Reichenbach's plant would then be *R. pomifera,* for n. 47, fasc. ix. Herb. Norm. has the leaves without glands below, but Reichenbach must thus have described another plant in his 'Flora Excursoria,' since he says:—"Fructu globoso pedunculoque hispido, laciniis calycinis integris, foliolis ovato-ellipticis, duplicato glandulo-serratis viridibus pubescentibus, subtus sparsim glandulosis." I do not know the plant distributed by Reichenbach.

16. *R. dumosa*, Puget, nov. sp.

17. *R. minuta*, Boreau in Déségl. Herb. Ros. n. 103.

18. *R. Grenierii*, Déségl. Herb. Ros. n. 38 and 38 *bis.*

19. *R. pomifera*, Herm. Diss. p. 16; Boreau, Fl. Cent. ed. 3, n. 886; Koch, Syn. 253.—*R. villosa,* L., sp. 704 (pro part.); Smith, Fl. Brit. ii. p. 538. *R. villosa,* var., α *pomifera,* Desv. Journ. Bot. ii. p. 117; Seringe in DC. Prod. ii. p. 618. Billot, Exs. n. 1482!; Wirtgen, Exs. n. 24!; Déségl. Herb. Ros. n. 105.

An elevated shrub with straight branches and scattered, slightly compressed, slender, straight prickles; petioles tomentose glandulose; with a few setaceous prickles below; 5–7 leaflets, the lateral petiolate, some sessile, the terminal rounded or slightly cordate at the base, and elliptic-oblong lanceolate (length $1\frac{1}{2}$ to 2 inches), leaflets greyish pubescent above, softly hairy below, doubly dentate, with large open teeth, the secondary teeth terminated with a gland; stipules oblong, glabrous

above, pubescent, glandulose below, the upper dilated, the points erect, bordered with glands; peduncles hairy, with long setaceous glandulose points, furnished at the base with oval acuminate bracts, tomentose, covered below with fine shining glands, and bordered with pedicellate glands, longer than the peduncles; calyx-tube globular, hairy, with strong setaceous points terminating in a gland; calycine segments hairy and glandulose, 2 entire, 3 with 1 or 2 lobes, terminated by a foliaceous appendage often a little denticulate, equalling the corolla, reflexed at flowering; style very hairy; petals of a beautiful rose colour, ciliate, glandulose at the base; fruit very large, globular, hairy, reddish-violet, crowned with the persistent connivent calycine segments.

June. Mountainous regions. France. Rhenish Prussia. Belgium.

"The specimens in Buddle's Herbarium (Herb. Sloane, vol. cxxvi. folio 22, British Museum) belong to this species. It is very doubtful whether this is a spontaneous plant with us. I have only seen two specimens, that in Buddle's Herbarium and that mentioned in my review, p. 14. The species is frequent in our gardens, and the specimen, n. 37! of Wood's Herbarium came from a garden. The fruit drawn on plate 583 of 'English Botany,' is from a garden rose."—J. G. Baker, in litt. February, 1866.

20. *R. recondita*, Puget, nov. sp.

Shrub from 16 inches to 5 feet high, with violet or purple branches; prickles of the stem scattered somewhat numerous, dilated at the base in the form of a disk, strongish, long, straight, horizontal, those of the young branches of a pale red colour, some very dilated at the base, often in pairs; the petioles canaliculated above, tomentose, glandulose, with five glands of a pale red colour, prickly below; 5–7 and sometimes 9 large leaflets, all petiolate, the terminal one oval, rounded at the base, leaflets from 1 inch to 1¼ inchess in length, elliptic-oblong, greyish pubescent above, softly hairy and covered with fine pale-red glands below, and prominent nervures, doubly toothed, with glandulose and more or less open teeth; stipules oblong, hairy above, pubescent, glandulose below, the points prickly, erect, or a little divergent, bordered with glands; peduncles solitary or 2–4, more or less hairy, with setaceous glandulose points, with oval bracts foliaceous to the apex, glabrous above, pubescent and with scattered glands below, generally longer than the peduncles; tube of the calyx subglobular, with setaceous points terminated by a gland, the calycine segments hairy, glan-

dulose, terminating in a foliaceous slightly-denticulate apex, bordered with glands and somewhat puberulent, spreading at flowering, then erect, 2 entire, 3 with some narrow lobes, linear and glandulose, prominent on the bud, shorter than the corolla; flowers of a beautiful rose colour; petals not ciliated at the base; styles hairy, numerous, in a round head, shorter than the stamens; disk absent; fruit red, large globular, hairy, crowned with the persistent calyx; segments pulpy, from the beginning of September.

This differs from *R. pomifera* in its leaflets glandulose below; stipules hairy above; petals not ciliated, and fruit smaller and red when ripe.

July. Mountainous regions. Valley of the Clyde, Lanarkshire (Hailstone); Hedges between Thirsk and Wood-end, Yorkshire (Baker). France. Piedmont. Switzerland.

DOMBEYA ANGULATA, Cav.

By Dr. M. T. Masters, F.L.S.

(From the 'Gardeners' Chronicle,' communicated by the Author.)

"Foliis cordatis, subrotundis, supra angulatis, serrato-dentatis, tomentosis; umbellis solitariis, numerosis, pedunculo communi petiolo breviori."—*Cav. Diss.* iii. 123, *t.* 39, *f.* 1; *DC. Prod.* i. 498.

To the above species, though not without hesitation, we refer a plant now blooming in the palm stove of the Royal Gardens, Kew, and for the opportunity of examining and describing which we are indebted to Dr. Hooker. Our doubts arise from the imperfect description and figure of Cavanilles. Nevertheless, as the plant at Kew evidently approaches more nearly to the species he figures than to any other that is known to us, we think it preferable to consider it as the true *D. angulata* than to regard it as the type of a new species. We add a description of the more salient features of the plant in question, drawn up from a comparison of the living plant with a dried specimen from Bourbon in the Kew Herbarium, and which clearly belongs to the same species:—A shrub or small tree, with loosely spreading branches; young shoots, leafstalks, leaves, and outer surface of the calyx covered with long, soft, simple hairs (not stelliform, as in most of the other species of the genus). Leafstalks 1–4 inches long; stipules deciduous,

subulato-lanceolate, scarcely an inch in length; leaves 2–5 inches long, 3–4 inches wide, cordate, roundish, palmately 5-, 7-, or 9-nerved, irregularly dentate, obscurely 3-lobed at the apex, lobules sharply pointed. Peduncles solitary, terminal, 1–2 inches long, bearing a fascicle of 8 or 10 slender pedicels, about an inch in length, equalling or not exceeding the flowers. Epicalyx of 3 deciduous, oblong-lanceolate, slightly concave bracts, nearly as long as the oblong, acute, concave spreading sepals. Corolla about an inch in diameter, of 5 obliquely obovate, blunt-pointed, pure white petals, twice the length of the sepals. Stamens 20, slightly coherent below, 15 fertile; anthers extrorse, 5 barren (staminodes), linear, somewhat club-shaped, flattened at the points, longer than the fertile stamens; filaments pink at the base. Ovary villose; style filiform, as long as the staminodes, surmounted by 5 revolute stigmas.

From *D. tomentosa*, Cav., a nearly allied plant, the present species differs in its more angular leaves, its more simple inflorescence, and in the narrow bracts of the epicalyx.

The plant here described is similar in habit and general appearance to the old *Sparmannia Africana*, and has been an inmate of the Royal Gardens for some years, though it has not previously produced flowers.

The dried specimen above referred to was collected in Bourbon; and that island, with Madagascar and the Mauritius, may be looked upon as the head-quarters of the genus. A few species, however, are found on the continent of Africa.

The elegance of the trusses of pure white flowers and their agreeable perfume can hardly fail to attract the attention of the plant-lover, more especially at this dull season; and hence it is to be hoped that cultivators may be able to overcome the straggling habit that the plant now possesses, and to induce it to flower at an earlier age, when it would become a valuable addition to the list of winter-flowering stove plants.

The stamens in this plant, as in all the Malvales, may be looked upon as compound, while the ordinary stamen corresponds to a simple leaf; the groups of stamens in the Mallows and allied Orders may be regarded as the equivalents of compound leaves, united together at their bases. Some of the lobes or leaflets of these compound leaves bear anthers, while others are destitute of anthers, and constitute the barren stamens or staminodes. Some light is thrown on the uses

of these barren stamens by an examination of the plant now under consideration. In the fully expanded flower, the inner surface of the upper angle or point of each petal is about on a level with the stigma and with the tip of the barren stamen, the outer flat surface of which latter, as well as the adjacent portion of the petal, are often dusted over with pollen, the true stamens nevertheless being at a considerable distance beneath these organs. In less fully developed flowers the barren stamens may be seen curving downwards and outwards, so as to come in contact with the shorter fertile stamens, whose anthers open outwardly, and thus allow their contents to adhere to the barren stamens. These latter, provided with their freight of pollen, uncoil themselves, assume more or less of an erect position, and thus bring their points on a level with the stigma, whose curling lobes twist round them and receive the pollen from them. The use, then, of the long staminodes seems to be to convey pollen from the short fertile stamens to the stigma, which, but for their intervention, could not be influenced by it. The presence of pollen on the upper and inner corner of the petals is readily explained by the fact that, owing to their position and peculiar form, they all come in contact with the ends of the staminodes and the stigmas, and hence they too get dusted with pollen.

These arrangements would therefore seem to favour self-fertilization, and they show how an organ spoken of sometimes somewhat contemptuously, as barren, rudimentary, imperfect, or the like, may yet play an important part both in the architectural plan of the flower, and in its life history.

AN INNOVATION IN NOMENCLATURE IN THE RECENTLY-ISSUED VOLUME OF THE 'PRODROMUS.'

[Of so much importance do we consider the innovation introduced in Dr. Müller's "Monograph of the *Euphorbiaceæ*," in De Candolle's 'Prodromus,' which we strongly condemned some months ago, that we reprint the following article from 'Silliman's Journal,' January, 1867, by Professor Asa Gray, in which he clearly and strongly shows the endless confusion which would follow the adoption of this practice.—Ed.]

Take, for example, the genus *Cephalocroton*, established by Hoch-

stetter in 1841. It appeared that Baillon had reduced it to two or three species upon which he had formerly constituted two other genera; and now Dr. Müller gives the genus as "*Cephalocroton*, Baillon." Take next the genus *Ricinocarpus*, established by Desfontaines, and adopted by the early monographer of the Order, Adrien Jussieu. It happens that the *original* of the genus has been published by Sprengel under the name of *Rœperia*, and named also by Sieber *Echinosphæra*. Is it for adding these two names as synonyms that the 'Prodromus' writes "*Ricinocarpus*, Müll. Arg."? Evidently not, as these synonyms are given by Endlicher. Is it because of two species now first described, of which the author constitutes two new sections of the genus, the rest of the species constituting *Euricinocarpus*? No other reason is apparent. But here no one, not the author himself, ever regarded these two new plants as anything else than species of *Ricinocarpus*—that is to say, of Desfontaines' genus.

Again, Adrien Jussieu dedicated to his friend Ampère a genus of a single known species; Brongniart added a second species; Dr. Müller has now added a third, and, forming for it a separate section, has taken the genus as his own! These are fair illustrations of the plan pursued throughout the volume. The principle acted on appears to be that whenever an author revises a genus and extends its limits, or adds any species which are not wholly homogeneous with the old ones, although in his opinion they belong to it, he may supersede the name of the founder of the genus by his own.

We suppose the rule would hold as well in case of the restriction, as of the amplification of a genus. Upon this principle, how many genera would be left to Linnæus? Not *Berberis*, for it would be attributed to the botanist who first remanded the pinnate species which composed Nuttall's genus *Mahonia*. Not even *Podophyllum*, for the second species, being hexandrous, brings in an important modification of the generic character. But the volume under consideration itself exemplifies the inevitable result. Out of the seventeen admitted Linnæan or ante-Linnæan genera it comprises, nine have lost the name of the founder. Half of the eight which retain it have only from one to six species each; and most of the rest, viz. *Stillingia*, *Omphalea*, *Manihot*, and *Andrachne*, have escaped apparently through some variation of the rule, or laxity in its enforcement, the grounds of which are not clearly obvious.

The same treatment is, naturally enough, applied to species. Take a single example from those presented on almost every page of the volume. Linnæus reduced all the forms of Castor-oil plant he knew to *Ricinus communis*, L. Dr. Müller does the same; but he knows many more forms, and has arranged them with exhaustive particularity under four primary divisions, sixteen varieties, and some of these into almost as many subvarieties. So this equivalent conclusion, resulting from a survey of more materials, is represented not by *R. communis*, L., but by *R. communis*, Müll. Arg. Now who shall decide upon the quantity of materials to be revised, or number of synonyms to be reduced, which may entitle a writer to take this great liberty? The only case which might seem to warrant it, is when two or more species of the same author and the same date are comprehended in one under a general character. Instances of the sort are probably to be met with in the work under consideration. But *Mercurialis annua*, from which the name of Linnæus has dropped, is not a case in point,—*M. ambigua* (regarded as a mere state of the former) having been published by the younger Linnæus.

Finally, there is a foot-note on p. 192, which should not pass unnoticed. For the statement, "Nomina non rite edita sunt nomina inania omnique prioritate carentia," as interpreted by the use made of it upon the occasion of the note, opens the way by which a just and well-established rule is made to operate in violation of the prevalent comity of botanists. Our own remarks upon this very point, in Silliman's Journal for March, 1864, p. 279, have been once or twice reprinted in Europe, without dissent; and we see no good reason as yet for recalling them. While the rule in regard to priority has its proper scope in maintaining that "manuscript names in collections, however public, should assert no claim as against properly published names," still "the distribution of named specimens [and, *à fortiori*, of these in sets, widely distributed among herbaria, as were Sieber's], where and as far as they go, is held to be tantamount to publication." So of names and original observations attached to specimens in herbaria. These names are always attached antecedently to publication; and a monographer, having, as he should, free access to all herbaria within his reach, might work a deal of harm if he did not regard such names as *to him* all the same as if already published. The full recognition of an obligation to do this has sensibly quickened the advance of botany, by securing the

early distribution of materials which might otherwise have been long withheld, and by widely opening herbaria to all competent working botanists, and especially to monographers, who should be the last to deprecate the system. No doubt, like other good and necessary things, it is open to abuse, and may now and then work some hardship. We would only remark that, whether on the whole the custom be good or bad, it is one for the introduction and maintenance of which we are indebted to no single botanist so much as to the founder of the 'Prodromus;' and he, of all others, would be most surprised to learn that *Leptocaulis echinatus*, etc., *Trepocarpus Æthusæ*, and *Eulophus Americanus*, were Candollean and not Nuttallian genera and species.

Upon the whole subject we would remark, in brief, that it can hardly be supposed that these innovations will pass unquestioned; that no living botanist now stands in such position that he can becomingly set aside, *mero motu*, recognized usages in nomenclature; that the closing volumes of the 'Prodromus,' which for forty years has been most efficient in establishing these usages, is hardly the proper place for changing them; and that, finally, a Botanical Congress, such as that over which, last spring, the distinguished editor of the 'Prodromus' so happily presided, would have been a proper body to consult upon subjects of such delicacy and general interest.

CALLUNA ATLANTICA, *Seem.*

Professor Asa Gray, in a notice of Dr. Seemann's paper on this Heather, published in a recent number of this Journal, says, in regard to the biological character on which the author of this species depended so much for its specific distinctness:—

"Probably in the station from which these specimens were lately transferred, as well as in Iceland and the higher Alps, whence Dr. Seemann has the same form, the plant was accustomed to complete protection by snow from changes of temperature the whole winter thr ugh. Unfortunately we have no specimens from Newfoundland, and Dr. Seemann does not speak of the Cape Breton, Nova Scotian, or New England plants. Upon examinations of these, we do not find that the indicated differences in structure (mainly the naked pedicels,

broader sepals, and tip of flowering branches not continued into a leafy shoot while the flowering lasts) coincide or hold out. So that as yet a second species can hardly be said to be established."

[*Silliman's Journal, January,* 1867.]

NEW PUBLICATIONS.

Report of Proceedings of the International Horticultural Exhibition and Botanical Congress, held in London from May 22nd to May 31*st*, 1866. (Pp. 428.)

This volume gives a complete history of the successful flower-show of last season, the list of prizes, names of subscribers, etc. etc. Even the music performed during the exhibition is recorded; indeed, the only thing we can think of as wanting in the report to render it quite exhaustive is the bill of fare, in courses, of the banquet at the Guildhall.

A more important part of the book, however, is that relating to the Congress of Botanists (and Horticulturists). This consists of the excellent introductory address of the President (A. De Candolle) and of reports, either at length or in abstract, of 32 papers selected out of some 50, read or "taken as read" at its meetings. These communications are printed in the languages in which they were read, English, German, or French; and though the majority are on horticultural subjects, there are some of strictly scientific interest.

In physiology, Professor Caspary, of Königsberg, contributes the results of some very elaborate observations on the effects of low temperatures in altering the direction of the branches of trees, from which it appears that different species are in this respect acted on in diverse manners, some moving during a frost vertically upwards, and others downward, whilst a lateral movement towards the left is nearly universal. Professor Morren, of Liége, describes experiments on the effects of certain gases especially of sulphurous acid gas on vegetation; and Dr. Hildebrand, of Bonn, adds another case (*Corydalis cava*) in which the law (perhaps universal) that, for the production of fertile seed, fertilization be effected by the pollen from a different flower, holds good.

In anatomy there is a careful paper on the structure of the testa of the seeds of the *Solanaceæ* and its allied Orders. This is illustrated with figures, as are also Mr. W. G. Smith's suggestive remarks on the nature of the corona in *Narcissus* (see 'Journal of Botany,' vol. iv. p. 169), and Dr. Masters's useful *résumé* of what is known of the nature of double flowers.

One of the most interesting papers we think, is that of Mr. Axel Blytt, of Christiania, on the vegetation of the Sogne Fjord, one of the larger arms of the sea on the coast of Norway. In this singular district, cut off from the rest of Norway by impassable mountains covered with eternal snow, and lying in lat. 61° N., all seasons and climates seem to be mingled and co-existent: whilst an Alpine flora extends down to the very sea-level, and its members grow on the rocks of the shore mixed with maritime species; vines, peaches, nectarines, and walnuts ripen their fruit in the neighbouring valleys, which are said to possess the climate of a hot-house. M. Blytt gives the upper limit of some of the common trees of the district, which it is interesting to compare with similar observations in this country.

It is only necessary to allude to Dr. Moore's and Mr. A. G. More's account of the climate, flora, and crops of Ireland, as the information given in it has been embodied and enlarged on in the more recent 'Cybele Hibernica' of the same authors. It is to be wished that the excellent map which illustrates this paper had been inserted in the 'Cybele' instead of the very rough one given with that work.

An interesting paper by Professor Lecoq, of Clermont, in which he endeavours to show that the mountain flora of Auvergne has originated by the agency of birds and the wind, and not by migration in the usual sense of the word, concludes the geographical communications, and when we have alluded to Mr. J. E. Howard's somewhat lengthy remarks on the Cinchona barks, which seem to resist any attempt at a satisfactory arrangement, we have mentioned all the more important papers.

Though the subjects treated of are sufficiently varied and interesting, they are collectively scarcely a fair expression of what might be done by the members of a Botanical Congress. In truth, however, the real value of such a meeting is not so much seen in the formal business transacted and papers read, as in the friendly feelings engendered by it, the interchange of opinion in conversation, and the bringing together

of men of similar pursuits who would not otherwise meet. In these respects, at all events, the late congress was successful.

Not the least interesting part of the volume is the statement of the expenses, which amounted to more than £16,000. Of this large sum, over £2000 were spent on the prizes, and £970 on the banquet, whilst the congress and conversazione together cost but £65.

It is satisfactory, too, to find that the exhibition paid its way, as it deserved to do, and we think great credit is due to those who so energetically superintended a show which has been probably never equalled, and which will long be remembered as a brilliant spectacle and most instructive exhibition.

Journal de Sciencias Math. Phys. e Nat. da Acad. Real das Scienc. de Lisboa. No. 1, Nov. 1866.

We gladly welcome this scientific journal from Portugal. There is not much botany in it, but the various articles show active workers in all the sciences, and botany is represented by the introductory matter to a systematic catalogue of the plants of Portugal, by C. M. G. Machado. After narrating the difficulties that beset his labour, the author gives short notices of the various botanists who have done any work with the plants of his country, and a list of the various works published in connection with his subject. He promises, in the continuation of his paper, a systematic list, with a record of the habitats of the different species.

We are indebted to Dr. Welwitsch for our acquaintance with this and the two following works.

Flora Fossil do Terreno Carbonifero. Por B. Ant° Gomes. Lisbon, 1865. Pp. 44, tabb. 6.

The only published descriptions of the fossil plants of Portugal are contained in two short papers by Sir Charles Bunbury, in the 'Quarterly Journal of the Geological Society of London.' It is gratifying to find a Portuguese *savant* so able for the work as Dr. Gomes evidently is, undertaking the description of the fossil plants collected by

the Geological Commission. The first part of the work is before us. It contains the species found in the coal measures, and a short note, with drawings, of some anomalous organisms from the Silurian strata. The great proportion of the coal plants described are Ferns. It is remarkable that no species of *Sigillaria* has been found, although the Stigmarian root occurs. With them are associated specimens of *Lepidodendron* and *Knorria*. The most interesting fossil described is the fruit of a species of *Calamites*, resembling what Brongniart called *Asterophyllites tuberculatus;* and certainly the same species as that to which Goeppert, in the last number of the 'Nova Acta' of the German Academy (vol. xxxii.), gives the name of *Aphyllostachis Jugleriana*. Dr. Gomes's specimen shows that the strobili were borne in whorls, though not so perfectly as Goeppert's fine specimens.

We hope to present our readers with a translation of Dr. Goeppert's paper, when we shall at some length describe the structure of this singular fruit, which we have been fortunate enough to determine from some beautiful specimens found by Mr. Binney. Dr. Gomes rightly refers it to *Calamiteæ*, and places that Order among the Cryptogams.

The fossil referred by the author, with a query, to *Cyperites*, is certainly a portion of the whorled foliage of a *Calamites*. It is to be desired that Dr. Gomes should either examine collections of the plants in our or other the Museums where this department of palæontology has been attended to, or obtain a collection of named specimens for comparison with those that are discovered in Portugal. Much more among the fragments of fossil plants, which are all the materials a student has to work with, than in recent botany, where it is found absolutely necessary, must one examine the specimens which have been described by former authors.

We trust the author will soon give us an account of the plants of the Secondary and Tertiary strata, for these are even more important than the palæozoic fossils, inasmuch as the laws affecting the geographical distribution of organisms become more apparent in the lower rocks; and we may expect, consequently, some novel forms in deposits which have not yet been examined. W. C.

Catalogue de la Flore des Isles Açores. Par Henri Drouet. Paris, 1866. Pp. 153.

The author has compiled the list of the plants of these islands from his own herborizations and from the published lists of previous authors. He has greatly increased the number of the species—for his catalogue comprises 727 species, three-fourths of which appear to be added by M. Drouet and his companions. It is to be regretted that he did not pay more attention to the synonymy. The number of species must be somewhat reduced when those are eliminated which are here inserted on the authority of former writers who have employed different recognized synonyms for the same plants, and whose names figure in the list as different species. Nor has M. Drouet always exercised ordinary care in working up his own plants. He has specimens in his herbarium of his plants, "No. 573. *Blechnum boreale*, Swartz.—Hab. San-Miguel, Fayal, Florès Pico, et la plupart des autres isles. No. 573. *Blechnum Spicant*, Roth.—Hab. San-Miguel, Terceira, dans les bois. Peu abondant et très-variable." P. 131. We might quote others equally careless.

BOTANICAL NEWS.

Professor de Barry has succeeded Dr. Schlechtendal as editor of 'Botanische Zeitung,' as well as in his chair at the University at Halle, and Dr. Garcke takes charge of Dr. Schlechtendal's other journal, the 'Linnæa.'

M. Pouchet, of Rouen, has observed that a small proportion of the seeds of *Medicago Americana* are able to withstand an uninterrupted boiling for four hours without losing their vitality. In the greater proportion of the seeds thus treated, the contents had swollen and broken the integument, and the water necessarily became mucilaginous, but others successfully withstood the high temperature, the outer integument resisting the water, so that when they were sown, they sprang up in the course of from ten to twenty days.

We understand that the Botanical Society of France have arranged to hold an International Botanical Congress in Paris, during the time of the Great Exhibition, to which botanists of all countries will be invited. The Congress will open on the 26th of July, and will last for a month. Meetings will be held every Friday evening at the Society's rooms, 84, Rue Grenelle, St. Germain. On other days during the period, visits will be made to the Exhibition, to the Museum of the Jardin des Plantes, to private collections; and excur-

sions will be made in the neighbourhood of Paris, especially during the latter part of August.

We close our record of the International Horticultural Exhibition and Botanical Congress by the publication of the following minute, which was unanimously adopted by the Executive Committee at a meeting on the 14th of January:—"That a communication be made to the Commissioners of the Exhibition of 1851, informing them that the Committee of the International Horticultural Exhibition have now remaining a balance of eighteen hundred pounds (£1800), which sum they are willing to invest in the purchase of the Lindley Library and other books, to form the foundation of a Botanical and Horticultural Library, to be attached to the Royal Horticultural Society, provided her Majesty's Commissioners, who are interested in the advancement of the South Kensington Estate, are willing to provide a suitable reading-room, with glass cases, for the reception of such library. The room and books to be for the use of Fellows of the Royal Horticultural Society, members of other societies, and gardeners generally, under such rules as may be agreed on. The Horticultural Society to nominate one of its officers or a clerk to look after the same. The room and library to be invested in the names of seven trustees—two appointed by the Commissioners, two by the Royal Horticultural Society, two by the International Committee, and one by the six above-named." When this is accomplished, the committee will cease to exist, but a fitting monument will remain of the great undertaking of last year—one that will prove a lasting benefit to all engaged in horticultural pursuits. It should however be remembered, that the Lindley Library is largely composed of books of interest only to the student of scientific botany, and we trust that some provision will be made whereby the library will be accessible to those who are not included in the designations of the minute, but who would profitably use volumes that otherwise might only gather dust and mildew on the shelves of the library.

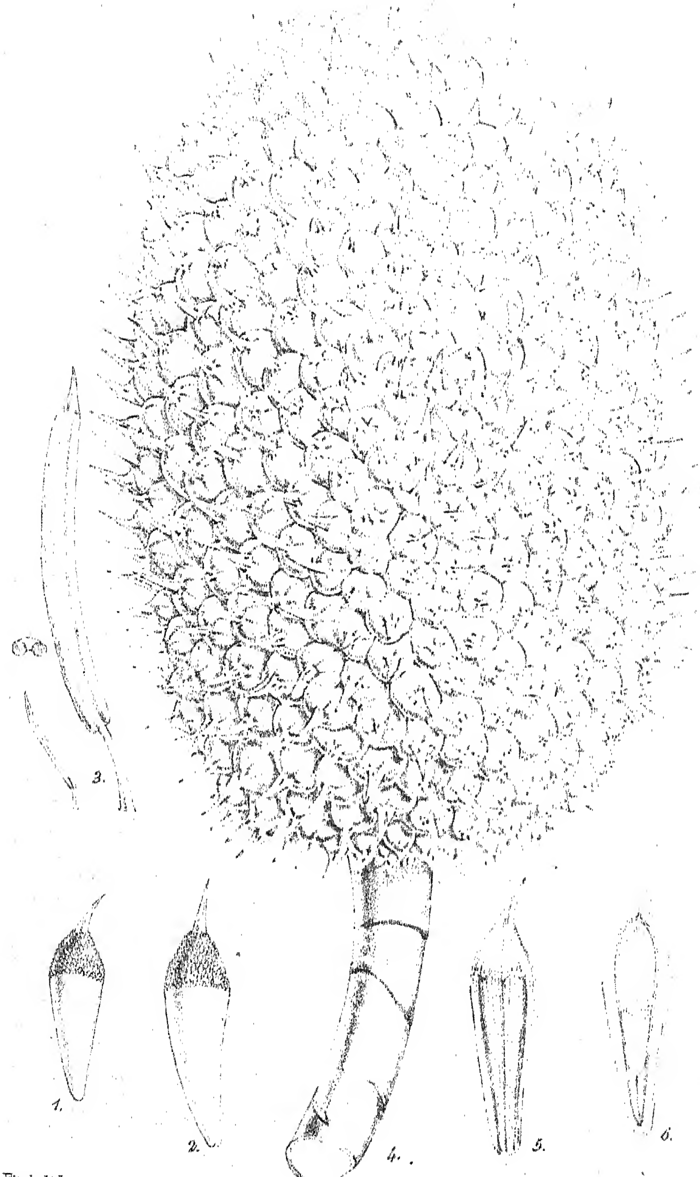
Mr. G. Munby has published a new and greatly improved edition of his Catalogue of the Indigenous Plants of Algeria, which we hope to be able to notice at greater length in an early number.

The large collection of fossil vegetables prepared by the late Mr. Nicol, the mineralogist, who invented the process of slicing hard substances for microscopic investigation, have just been purchased by the Trustees of the British Museum. They were bequeathed by Mr. Nicol to the late Alex. Bryson, who was ardently devoted to natural history pursuits, especially to palæontology. He has not only carefully conserved the Nicol collection, but greatly added to it, so that now it consists of nearly six hundred slides. It is well that so valuable a collection has become national property, and so accessible to all students.

Flora of Middlesex.—Dr. Henry Trimen and Mr. Thiselton Dyer take this opportunity of thanking the numerous botanists who have sent them lists and notes bearing on the plants of Middlesex, and they hope that any others who may have similar material at hand will not delay in forwarding it, as it is intended, if possible, to print the work in the autumn.—Address, Dr. Trimen, 71, Guilford Street, Russell Square, W.C.

Botanical Society of Edinburgh.—*Thursday, 14th February.*—Wm. Gorrie, Esq., Vice-President, in the chair. The following communications were read:—1. Obituary Notices of James Smith, Esq., of Jordan Hill, of Dr. G. A. Martin, Isle of Wight, and of George Ure Skinner, Esq., of Guatemala. By Professor Balfour. James Smith was born in Glasgow on 15th August, 1782. He was the eldest son of Archibald Smith, an eminent West India merchant. He was educated at the Grammar School and University of Glasgow, where he acquired an excellent classical education, and imbibed a taste for physical science. He was the author of many valuable works, principally on geological subjects. He was a Fellow of the Royal Societies of London and Edinburgh, and he became a member of the Botanical Society on 9th December, 1858. He died on 17th January last, at the age of eighty-five. Dr. George Anne Martin, of Ventnor, Isle of Wight, was one of the early members of the Society, having joined on 14th April, 1836. He prosecuted his medical studies at the University of Edinburgh, and took his degree of M.D. in 1837. He settled at Ventnor, and acquired a high reputation as an able and valued practitioner. He was taken seriously ill on 28th December last with an apoplectic attack, and he lingered till 7th January, when he expired, at the age of sixty. George Ure Skinner, Esq., a partner in the house of Klee, Skinner, and Co., Guatemala, was a native of Newcastle, and one who had done much for natural history, and specially for botany. He was the second son of the late Very Reverend Dean John Skinner, of Forfar. At the the age of fourteen, Mr. Skinner's spirit of adventure led him away from home, and from that time he continued to maintain himself by his own exertions. He went to Central America as a merchant, where, amid all his busy work, he never lost sight of the interests of science, and he introduced many very valuable and beautiful plants into this country—more particularly Orchids. Of the latter plants, there are many species named after him, such as *Lycaste Skinneri*, *Cattleya Skinneri*, and *Epidendron Skinneri*. Mr. Skinner left Britain on 3rd December last for Central America, and, in a letter to his relative, Baillie Skinner, of Edinburgh, at that time, he stated that he was about to cross the Atlantic for the thirty-ninth time, and with the intention of returning to Britain in the early spring of this year, finishing with America, and intending then to retire for the rest of life, if God pleased to spare him. On reaching Aspinwall, Panama, he was seized with yellow fever, and died there on 9th January last, at the age of sixty-two. 2. Notice of some *Diatomaceæ* from Ireland. By Dr. W. R. M'Nab. The author stated that, while recently examining an *Alga* which was collected by M. Ed. Jardin, in the Logarness—the hot stream coming from the Great Geyser, in Iceland,—he had discovered a few *Diatomaceæ* amongst the filaments of the plant. They belonged chiefly to the genera *Epithemia*, *Cymbella*, *Stauroneis*, *Pinnularia*, *Synedra*, and *Gomphonema*. All the larger species of these genera were exactly the same as those occurring in Scotland in cold water. The geographical distribution of the *Diatomaceæ* is an interesting subject, and it is also curious that, besides possessing, as certain species are known to have, a very wide area of distribution, they can also endure a great difference in temperature, such as exists between the waters of

Scotland and those coming from the Great Geyser. 3. Some account of Botanical Travels in Oregon. By Mr. Robert Brown. Communicated by Mr. J. Sadler. In this communication, dated Victoria, Vancouver's Island, 9th February, 1866, Mr. Brown gave some account of his botanical travels in Oregon, between 2nd September and 9th October, 1865. The part of the country travelled embraced from Rogue River Valley over the mountains to Crescent City in California, and from thence by San Francisco to Victoria. He noted the various features of the country and manners of the people, and recorded the more interesting plants he met with. 4. Notes regarding *Polypodium calcareum* as a Scottish Plant. By Mr. Sadler. Mr. Sadler stated that the discovery of *Polypodium calcareum* near Aberdeen, in 1861, by Mr. John Sim, and near Aberfeldy, in 1866, by Mr. Ramsay, and recorded in the Transactions of the Society, had given rise to doubts in the minds of some as to the plant being indigenous in these localities. He had investigated the subject as far as possible, but could find no traces of its having been introduced in either instance. The Aberdeen plants were found growing in an old limestone quarry on Scotston Moor, and the Aberfeldy plants abundantly on decomposed micaceous stone. Professor Dickie was inclined to believe that the Aberdeen fern had been planted, and Mr. Taylor, of Allan Vale, says that a gentleman's gardener planted *Asplenium Trichomanes* on the wall at Scotston Gate, where it now grows plentifully. Mr. Sadler exhibited specimens of the plant from both localities, and concluded by reading extracts from letters on the subject which he had lately received from Mr. Ramsay, Mr. Sim, and Mr. Taylor. 4. Report on the State of Open Air Vegetation in the Royal Botanic Garden. By Mr. M'Nab. The first snowdrop seen in bloom was on the 31st day of January, and that only on a south exposed grass bank, where the frost got speedily out, but in all other situations throughout the garden it was the 5th day of February before they began to show flowers profusely. The first flower of *Eranthis hyemalis* and *Hepatica triloba* appeared on the 2nd of February; *Sisyrinchium grandiflorum* on the 4th of February; *Leucojum vernum* and *Galanthus plicatus* on the 5th of February; *Helleborus purpurascens* and *Arabis albida* on the 6th of February; and *Crocus Susianus* on the 11th of February. Mr. J. F. Duthie sent specimens of *Centunculus minimus*, collected at North Sannox, Arran, in September, 1866, the first time it had been met with in that island. Thomas Patton, Esq., presented two cones of *Pinus monticola*, ripened at Glenalmond, Perthshire. One cone was of a red colour, while the other was of a yellowish-brown. They were taken from different trees, the cones of which are invariably the same every year as the two exhibited.



Fitch, lith.

Tab. 63.

REVISION OF THE INDIAN SCREWPINES AND THEIR ALLIES.

By S. Kurz, Esq.

(Plates LXII. and LXIII.)

This revision of Indian *Pandanaceæ* is founded especially upon the rich collection of forms growing in the Botanical Gardens at Buitenzorg, Java. Since I left that place I have had opportunity to compare many continental forms, so that I hope to have mastered the greater bulk of Screw-Pines occurring in India. Therefore I venture to publish my observations, moreover as I feel convinced that a final elaboration of this apparently difficult group can be effected only after the first step is done,—that to elucidate the material already published, and to compare it in nature.

Regarding the limits of species, Orders, etc., in the alliance of *Spadicifloræ*, I defer to say anything, as I find it premature to speak about a thing that we have been unable until now to explain satisfactorily, contenting myself to bring the different forms into such a frame, that they might be recognized easily hereafter. Having done so, and using the word "species" only as a substitute for the denomination of some temporary form, or of an alliance of such forms as are observed to pass into each other during our present period of experience, I hope to avoid the views of the so-called hairsplitters.

Typhaceæ are incorporated, by Dr. J. D. Hooker, in *Aroideæ*, and there is indeed little difference when comparing *Gymnostachys* and *Acorus*. It is however a logical consequence to connect also *Pandanaceæ* and *Cyclanthaceæ* with the same family, as I can bring forward not a single fact which could be important enough for a separation. Thus we would have reduced the class of *Spadicifloræ* to the Natural Order of *Aroideæ*, Juss.

Nipa is now, I hope, generally admitted to *Palmæ*, even as *Phytelephas* must form an allied family or subfamily to that Order.

Thus we would obtain the following suborders for consideration:—

I. Typhaceæ.—Flores monoici, spicæ v. syncarpia; achenia v. drupæ; ovula pendula, cum embryonis extremitate radiculari supera.—*Herbæ aroideæ, foliis distichis v. inermibus, floribus in spicas v. in glomerulos aggregatis.*

A. TYPHINEÆ.—Flores in spicas dispositi, basi antherodiis filiformibus cincti; achenia libera, dein spurie pedicellata.

1. TYPHA, *Linn.*

B. SPARGANIEÆ.—Flores glomerati, squamis perigoniati; drupæ in syncarpia aggregatæ, sessiles.

2. SPARGANIUM, *Linn.*

II. PANDANACEÆ.—Flores dioici, eperigoniati, syncarpia; drupæ fibroso-lignosæ, plerumque epicarpio carnescente, simplices v. per phalanges connatæ, stigmatibus induratis coronatæ; ovulum placentæ lateralis basi adnatum, erectum, solitarium, cum embryonis extremitate radicali infera.—*Arbores v. frutices, foliis simplicibus utplurimum armatis trifarie v. rarissime exacte spiralibus.*

1. PANDANUS, *Rumph.*

III. CYCLANTHACEÆ.—Flores dioici, monoici v. rarius subpolygami, syncarpia, baccæ v. rarius drupæ, liberæ v. per phalanges connatæ; placentæ plures parietales, tot quot stigmata; ovula plurima, horizontalia, cum embryonis extremitate radiculari infera. —*Plantæ perennes lignescentes, aroideæ, sæpe alte scandentes, foliis distichis simplicibus v. sparsis flabellato-partitis.*

A. FREYCINETIEÆ.—Folia simplicia, disticha.—*Frutices fere omnes scandentes.*

1. FREYCINETIA, *Gaud.*

B. CYCLANTHEÆ.—Folia sparsa, flabellato-partita.—*Frutescentes, erectæ.*

2. CARLUDOVICA, *R. et P.*

3. EVODIANTHUS, *Oerst.*

4. SARCINANTHUS, *Oerst.*

5. DISCANTHUS, *Spruce.*

6. CYCLANTHUS, *Poit.*

N.B. The number of American species (and even of genera) of *Cyclanthaceæ* will prove by a more close study to have been exceedingly overrated. I have no materials at my disposal for examination, and it would be very hazardous therefore to reduce some of the thirty-six published species from the descriptions only.

TYPHACEÆ.

1. TYPHA, *Linn.*

1. *T. elephantina*, Roxb. Fl. Ind. iii. 566, ejusd. Icon. ined. xiv. 40;

Kth. En. Pl. iii. 92. Folia lato-linearia, scapo vix breviora, basin versus excavato-trigona; spica feminea a mascula remota.

Hab. Bengal, along rivers and banks, common, *Roxburgh;* Calcutta!, Assam, *Masters, n.* 534!; Peshawer, *Dr. Stuart, n.* 236!; Kullu, N.W. Himalaya, *Dr. Brandis!*

A noble plant, 1–12 feet high, which cannot possibly be confounded with *T. angustifolia.*

The scapes are leafy only at the lowest part; the leaves about as long as the scape, 1–2 inches broad, and at the base nearly excavated-three-sided. The two outer (primary) leaves are only ½–1 foot long, and shaped precisely as in *T. angustifolia.*

Roxburgh's figure, above quoted, is very bad, and only from the transverse section of the leaf, which he gives, I am enabled to identify his plant.

2. *T. latifolia,* Linn. Spec. 1377 (Moris, i. 8. t. 13. f. 1); Flor. Dan. t. 645; Smith, Brit. iii. 959; Willd. Spec. iv. 197; Engl. Bot. t. 1455; Schkuhr, Handb. iv. t. 271; M. Bieb. Flor. iii. 611; Mey. Esseq. 262; Ledeb. Flor. Ross. iv. 249; Rich. in Guill. Arch. i. 193. t. 5; N. E. Gen. 2. t. 1; Reichb. Germ. ii.; Koch, Syn. Fl. Germ. 681; Kunth, Berol. ii. 303; ejusd. Enum. Pl. iii. 90. Folia linearia plana, scapo longiora; spica feminea cum mascula continua.

Hab. This species is mentioned by Dalzell and Gibson in the Bombay Flora; further by Edgeworth in his 'Mooltan Plants.'

Distr. Europe!, Tauria, Caucasus, Southern Siberia, North and Central America.

3. *T. angustifolia,* Linn. Sp. Pl. 1377; Smith, Brit. 959; Willd. Sp. Pl. iv. 198; Engl. Bot. t. 1456; Flor. Dan. t. 815; M. Bieb. Fl. Taur. Cauc. ii. 379; Ledeb. Fl. Ross. iv. 249; Dcne. Descr. Herb. Timor. 38; R. Br. Prodr. 338; Reichb. Germ. 11; Koch, Syn. Fl. Germ. 681; Roxb. Fl. Ind. iii. 567; Kunth, Berol. ii. 304; ejusd. Enum. Pl. iii. 91; De Vriese in Pl. Jungh. i. 106; Hassk. Fl. Bot. Ztg. 1842, Beibl. ii. 12; Blanco, Fl. d. Filip. 687; Miq. Fl. Ind. Bat. iii. 173.—*T. elatior,* Bœnningh. in Reichb. Germ. 11; Boreau in Guill. Arch. ii. 399; Kunth, Enum. Pl. iii. 90. *T. minor,* Curt. Lond. Fasc. iii. t. 62. *T. Damiattica,* Ehrenb. in Hort. Berol. 1834. *T. angustata,* Bory, MS. *T. Javanica,* Schnitzl. in Zoll. Cat. 77. *T. Shuttleworthii,* Koch et Sond. in Koch, Syn. Fl. Germ. ed. ii. 785; Pl. Preuss. ii. 3. *T. Brownei,* Kunth, Enum. Pl. iii. 92. *T. latifolia,* Forst. Prodr. 64.

HAB. Bengal, not so common as the former, *Roxburgh*; Calcutta!, Mutlah, *T. T.!*; Ceylon, *Thwaites, C. P.* 3218!; Herb. Wight; Wall. Cat. 4989!; Peshawer, abundant up to 2500 ft., *Dr. Stewart, n.* 180 *et* 632!; Afghanistan; *Griff. n.* 5621!; Java!; Timor.

DISTR. Nearly cosmopolitan.

4. *T. minima*, Funk, in Willd. Sp. Pl. iv. 194; Pollin. Veron. iii. 101. t. 1; M. Bieb. Fl. Taur. Cauc. ii. 379; Koch, Syn. Fl. Germ. 681; Kunth, Enum. Pl. iii. 91.—*T. angustifolia*, β, Linn. Sp. Pl. 1378. *T. minor*, Bauh. Hist. ii. 540; Lob. Ic. 81; Smith, Brit. iii. 960; Engl. Bot. t. 1457; Willd. Sp. Pl. iv. 197. *T. elliptica*, Gmel. Bad. *T. intermedia*, Schleich. Cat. 59. *T. media*, De Cand. Syn. 148; ejusd. Gall. v. 302; Moric. Venet. i. 20; Pollin. Veron. iii. 100.

HAB. Afghanistan, *Griff. n.* 5622!

DISTR. Europa media!, Caucasus.

Linné may be quite right in considering this species a mere variety of *T. angustifolia*. My material at disposal does not allow me to decide the question.

Species dubia.

T. Bungeana, Presl, Epim. Bot. 239; Walp. Ann. iii. 495.—*T. minor*, Bunge.

HAB. Northern China.

2. SPARGANIUM, *Linn.*

1. *S. erectum*, Linn. Sp. Pl. 1378.—*S. ramosum*, Huds. Angl. 401; Smith, Brit. iii. 961; Engl. Bot. t. 745; Willd. Sp. Pl. iv. 199; Fl. Dan. t. 1282; M. Bieb. Fl. Taur. Cauc. ii. 380 et iii. 611; Ledeb. Fl. Ross. iv. 236; N. E. Gen. ii. t. 2. f. 1; Koch, Syn. Fl. Germ. 683; Beck, Bot. U. S. 379; Kunth, Berol. ii. 304; ejusd. Enum. Pl. iii. 89.—*S. stoloniferum*, Hamilt. in Wall. Cat. 4990. *Sparganium* sp., Griff. Not. Monocot. 158. t. 166 et 168. *S. carinatum*, Ham. in Roxb. Ill. Him. Fl. 408.

HAB. Kashmir, *Falconer!*; Ind. bor. occ. 1000′, *T. T.!*; Magatar, *Wall. Cat.* 4990!; Afghanistan, *Griff. n.* 5619!; Burma, Nempeen, *Griff.*

Var. β. *simplex*, Linn. Sp. Pl. 1378 (sec. Kunth).—*S. simplex*, Huds. Angl. 401; Smith, Brit. iii. 962; Engl. Bot. t. 745; Fl. Dan. t. 932; Willd. Sp. Pl. 199; N. E. Gen. ii. t. 2. f. 2–14; Ledeb. Fl

Ross. iv. 236; Koch, Syn. Fl. Germ. 682; Kunth, Berol. ii. 305; ejusd. Enum. Pl. iii. 89.

HAB. East Bengal, *Griff. n.* 5618!; Assam, Khasya hills, n. 4000–6000′, *J. D. H.!*; *ib.* and Nunklow marshes, *Simons!*; Sikkim, 7–9000 ft., *J. D. H.!*

N.B. There is also a specimen with very narrow leaves in the Calcutta herbarium, collected by Simons, but too incomplete for determination.

PANDANEÆ.

1. PANDANUS, *Rumph. et Linn. fil.*

The genus *Pandanus* is mentioned first by Rumphius in his Amb. Herb. iv. p. 139 seq., where he describes twelve species, one of which belongs to *Freycinetia*, and illustrates some of them. It is however not easy to identify the same without visiting that classical locality.

Rheede's figures of his seven kinds of *Kaida*, belonging to this genus, are far better than those of Rumphius, though his descriptions leave much to desire.

Upon the works of these two authors, principally, Linn. f., founded his genus *Pandanus*, and adopted Rumphius's name. He characterized it, however, so briefly and incompletely, that only his citations enable us to recognize what he meant. Since then, the character of this genus has been remodelled by several eminent botanists,—as R. Brown, Kunth, Endlicher, etc.

The first botanist who undertook to split this genus, naturally so well limited, was Gaudichaud, in his 'Botany of the Bonite.' He divides it into not less than sixteen genera, and figures a multitude of species. I have not his work at my disposal, and as he gave no descriptions nor any references but those figures, I am compelled to omit them.

Hasskarl and De Vriese both have endeavoured to multiply the genera of *Pandaneæ*, by describing a genus already known to Forskål as *Keura*, and by Forster so masterly figured as *Arthrodactylis*, as *Doornia*, De Vr., and *Marquartia*, Hassk. (later, *Hasskarlia*, Walp.), and De Vriese adds a new genus, *Ryckia*. I however shall scarcely have need to apologize for reducing all those genera to the old Rumphian genus of *Pandanus*.

The distribution of the species of this genus is confined to the Eastern

hemisphere. Their centres are in the Malayan archipelago and in Madagascar. Their northern limit is in China and in the Himalaya hills, where the Korr (*P. furcatus*) occurs in abundance. This extension, so far to the north through the hilly parts of Assam, is owing, without doubt, to the moist condition of those countries. From Japan, too, Zuccarini notes species of *Pandaneæ* (Münchner Gelehrte Anzeigen, 1841 and 1844, "Notizen über die Flora von Japan u. die bisher hierüber vorliegenden Leistungen"). (This work is not accessible to me.)

In N.E. Australia and the Pacific islets we have perhaps their S.E. and E., in Western Africa, surely their western limits. *Pandanus verus*, Rumph., reaches the north-western Himalaya, but surely only cultivated, as is the case in Arabia.

Overlooking the whole area, where *Pandani* grow wild, we become soon aware that all kinds are confined to moist regions of the tropics and subtropics. They prefer principally marshy forests, like those which are so characteristic of Sumatra and other Malayan islands. *Pandanus verus*, however, prefers more the sandy beaches along the sea. No species however is ever observed in Mangrove swamps.

It is remarkable that of some species, though abundantly occurring, only the males, of others, only the female plants have become known. We see often whole tracts of the sandy seashores covered by female plants of *P. verus*, without a single male amongst them; so, on the contrary, all known plants of *P. lævis* are males. *Pandanus dubius* produces fruits, which germinate quite freely, though without being fecundated by males.

It might be objected that the fecundation has been effected by some other allied species, but the young plants do not differ at all from their parents.

Hybrids are, so far as I am aware, not yet observed anywhere between the tropics, except in gardens. Dr. Wallich, treating on the genus *Hedychium* in Hook. Journ. of Botany, v. (1853), has already made the same observation, and if we compare the distribution of hybrids in their wild state, then it is indeed striking to see the same restricted to the most cultivated parts of the globe, to Europe only. The number of hybrids there increases yearly.

Only between different species of *Blumea* (*B. lacera, oxyodonta, bifolia*) I suspect hybrids in cultivated grounds, but as yet I cannot confirm this by direct observation.

Much difficulty in working up a monograph of the genus *Pandanus* is caused by the very incomplete knowledge which we possess of the Mascarhen species. The number of them is considerable, in comparison with the Indian species. I have not the advantage of being able to consult Gaudichaud's work, which, without doubt, would throw some light upon this matter.

With reference to the sections which I have adopted, I must remark that they can be considered only preliminary ones. Of most species I have not had the opportunity of examining both sexes. In particular, it might be proved, by more complete material, that *Ryckia* and *Microstigma* must be somewhat remodelled.

Rumphius (Herb. Amb. iv. p. 145) very originally remarks, "Certum enim est Pandanos sat laboris causare curiosis ipsorum investigatoribus, ut rite distinguantur; puto autem non tanto dignos labore, quum ipsorum plurimi exiguum præbeat usum." This latter clause, however, may be doubted, considering that five-sixths of the Malayan population sleep on pandan mats only, and that many of them live entirely by making such mats, hats, etc. from the leaves of *Pandanus*.

There is no doubt, so far as I am acquainted with the species of these peculiar plants, that *Pandanus* really includes protean forms in such a degree that it is difficult to give a good description of some of them. A long series of forms is often required to ascertain the real limits of a species, and this is here the more difficult, as we are mostly confined to our memory only. Though I had so extensive a collection of growing Screwpines at my disposal in the botanical gardens at Buitenzorg, I came to a conclusion only after examination of many continental forms. Characteristic as the different species may be, there is scarcely any part of the plant which may not vary in any degree, and the stigmata themselves appear often very elongated in the one and shortened in the other form, but without therefore giving up their essential value. In the phalangeal group there frequently may be found a single free drupe amongst the phalanges. Such degrees of variation are the more to be attended to, as the varieties, owing to their arborescent growth, appear commonly very constant. Determinations of Screwpines in European hothouses I consider therefore quite insufficient, and only promoting the amount of synonyms.

In the following pages I have enumerated all the gerontogeous species, partially because some of them may be found on the Indian

continent, partially for a better review of the whole material scattered through different works.

SECT. I. ACROSTIGMA. *Drupæ simplices; stigmata spinescentia, simplicia, persistentia, filamenta libera; antheræ acuminatæ. An genus proprium?*

1. *P. caricosus*, Rumph. Herb. Amb. iv. 154; Spreng. Syst. iii. 897; Kth. Enum. iii. 98; Hassk. Cat. Bog. p. 60?; Miq. Fl. Ind. Bat. iii. 163. Humilis, cæspitosus v. caulescens; folia subflaccida, sursum subplana, marginibus costâque subtus a medio spinulosa, saturate v. lutescente viridia; syncarpia echinata, solitaria, cernua, ovalia v. subglobosa, pugni magnitudine, brunnei v. fusco-brunnei; drupæ siccæ, granuloso-scabræ.—*Pandanus atrocarpus*, Griff. Notul. Monocot. 160.

HAB. Indian Archipelago, common; Java!, Toedjoeng Koelau!, *Teijsmann!* Salak, common, 4000 ft.! etc.; Malacca, *Griff.*; Moluccos, *Rumphius*.

DISTR. Fiji Islands, *Seemann*, *n.* 650.

Subacaulis v. caulescens, dense cæspitosus, caudicibus brevibus terræ incumbentibus v. hypogæis pollicem crassis. *Folia* coriacea, spiraliter trifaria, subflaccida, 5–8-pedalia, $1\frac{1}{2}$–2 poll. lata, linearia, acuminata, lateribus rectangulariter deviis v. apicem versus subplana, supra saturate v. flavescente viridia, nitentia, in nervis 2 lateribus apicem versus sæpius bullato-spinulosa, subtus glaucentia, marginibus costâque a medio dense spinuloso-serrata; spinulæ minutæ, tenues, rectæ, albidæ. *Spathæ* fœtidæ, sursum sensim minores, densiuscule imbricatæ, lato-ovatæ, carinato-acuminatæ, striatæ, sulfureæ, nitentes, marginibus carinâque spinuloso-ciliatæ, summæ obtusæ, carnescentes. *Stamina* simplicia, ex axi carnoso cito putrescente dense et irregulariter erumpentia; antheræ longissime mucronato-acuminatæ, albæ; filamenta brevissima, libera. *Syncarpia* erecta, dein cernua, pugni v. ovi Casuarii magnitudine, globosa v. oblonga, pallide fusca v. atro-fusca, solitaria, spathis foliis subconformibus cincta. *Drupæ* parvæ, obsolete hexagonæ v. rarius teretiusculæ, apice granuloso-scabræ, stylo continuo persistente simplici longiusculo acuminatæ; stigma laterale, lineare.

NOM. VERN. Sarengseng, *Mal.*

OBS. Toodongs (a kind of hat) and mats (called Kadjang) are made of the leaves.

TAB. LXII.—Figs. 1 and 2. Drupes, magnified. Fig. 3. Stamen.

2. *P. affinis*, Kurz. Fruticosus, humilis; folia subflaccida, marginibus costâque subtus a medio spinulosa, subtus glaucescentia; syncarpia racemosa, erecta, ovi gallinæ magnitudine; drupæ læves.—*P. humilis*, Lour. Fl. Coch. 740?; Kurz in Natuurk. Tydschr. v. Ned. Ind. xxvii.; Thw. Enum. Pl. Zeyl. 327?

HAB. Ceylon, *Thwaites, C. P.* 3740?!; Indian Archipelago; Java, hilly parts!; Banca!

Folia in sicco subtus glauca, costa a medio tantum spinulosa; spinulæ densæ, minutæ, rectiusculæ, in sicco testaceæ. *Syncarpia* 3–4, nonnunquam 5–7, conglomerato-racemosa. *Drupæ* læves, apice pyramidato-5–6-gono in stigma longum simplex spinescens terminantes.

This species is very nearly allied to *P. fœtidus*, and I doubt whether the plant from Ceylon really belongs here, or rather constitutes a racemose variety of the following.

3. *P. fœtidus*, Roxb. Fl. Ind. iii. 742; ejusd. Icon. ined. xvi. t. 5–6; Kunth, Enum. Pl. iii. 98; Miq. Fl. Ind. Bat. iii. 163. Cæspitosus v. caulescens, humilis; folia subflaccida, marginibus costâque totâ subtus distanter spinosa, glauco-viridia; syncarpia solitaria, cernua, pugni v. ovi struthionis magnitudine, rubra; drupæ læves, carnescentes.

HAB. Bengal!; Assam, *Masters!*, *Jenkins!*

Fruticosus, caulescens, basi radicans v. cæspitosus. *Folia* spiraliter trifaria, coriacea, subflaccida, 4–6 ped. longa, 2–3 poll. lata, acuminata, glauco-viridia, marginibus costâque subtus (basin versus antrorse retrorseque) spinosa, sæpe supra in plicis apicem versus spinulosa; spinæ curvatæ v. rectiusculæ, crassiusculæ, albidæ. *Spathæ* pulchre luteæ, nitentes, margine carinâque spinulose ciliatæ, fœtidæ. *Stamina* axim carnosum cito putrescentem dense obtegentia; antheræ elongatæ, mucronato-acuminatæ, albidæ; filamenta libera, brevissima. *Syncarpia* cernua, solitaria, oblonga, magnitudine valde varians, nunc ovum gall. nunc id struthionis circumferentia fere attingentia, maturescentia rubra. *Drupæ* lævissimæ, maturescentes glutinoso-compactæ, apice pyramidato-5–6-gono in stigma longiusculum simplex spinescens terminantes.

TAB. LXII.—Fig. 4. Fruit. Figs. 5 and 6. Drupes, after Roxburgh.

SECT. II. RYCKIA. *Drupæ simplices; stigmata spinescentia, sæpius furcata, secedentia; filamenta connata; antheræ aristatæ (an semper?).* (Ryckia, *De Vriese*.)

4. *P. helicopus*, Kurz in Miq. Ann. Mus. Lugd. Bat. iii. 54. t. 2.

Fruticosus, humilis (v. usque 20-pedalis teste cl. Teijsmann); folia stricta, e basi attenuatâ lanceolata, marginibus costâque subtus subtiliter spinulose serrulata, nitentia, subtus glaucescentia; syncarpia solitaria, valde tortuoso-pedunculata, elongato-trigono-elliptica, obtusa, pedem longa, carnescentia, testacea; stigmata simplicia, spinescentia.

HAB. Along the margins of ricefields on Bangka (near Sumatra).

NOM. VERN. Rassau, *Mal.*

5. *P. furcatus*, Roxb. Fl. Ind. iii. 744; Spreng. Syst. iii. 898; Kunth, Enum. Pl. iii. 98; Hassk. Pl. Jav. Rar. 163; Miq. Anal. Ind. p. 10. t. 2; Pl. Jungh. i. 167; Miq. Fl. Ind. Bat. iii. 162. t. 37 (♂). Arbor parva, simpliciuscula, 10–30-pedalis, v. frequentius divaricato-ramosus; folia longissima, crassa, acuminatissima, marginibus costâque subtus incurvato-spinulosa, atro-viridia; spathæ inodoræ, largissimæ, marginibus carinâque spinulosæ; stamina fasciculato-connata; syncarpia solitaria vel racemosa, peponis minoris v. capitis infantis magnitudine, oblonga, rubra v. testacea; drupæ carnescentes, apice planiusculæ v. convexæ; stigmata incurva v. rectiuscula, spinescente-furcata. —*Kaida Tsjerria*, Rheede, Hort. Malab. ii. t. 8. *Pandanus crassipes*, Wall. Cat. *P. horridus*, Rwdl. ms. *Ryckia furcata*, De Vriese in Versl. Kl. Acad. Wet. 1854; ejusd. Tuinb. Fl. i. 161; ejusd. in Hook. Kew Misc. vi. 268; Walp. Ann. v. 858. *P. caricosus*, Miq. Anal. Ind. ii. 16 (non Rumph.). *P. Lais*, Kurz in Natuurk. Tydschr. v. Ned. Ind. xxvii.; ejusd. in Miq. Ann. Mus. Lugd. Bat. ii. 54 (forma syncarpiis racemosis testaceis). *P. spinifructus*, Dennst. Clav. Hort. Malab.

Var. *a. Indica;* syncarpia pulchre crocea, solitaria v. racemosa; drupæ breve obconicæ, apice valde concavæ; stigmata crassa, vix incurvata.

HAB. From Chittagong and Pegu! to the Assam hills!, Naga hills, *Masters!* and Sikkim Himalaya!; Ceylon, *Thwaites, C. P.* 2734!

NOM. VERN. Korr *in Sikkim.*

Var. *β. Malesica;* syncarpia testacea, solitaria v. racemosa; drupæ elongato-obconicæ, apice planiusculæ v. depressæ; stigmata graciliora, incurvata.

HAB. Indian Archipelago; virgin forests of western Java up to 3000–4000 ft., common!; Sumatra!; Bangka!; Singapore!

NOM. VERN. Tjangkoang v. Bangkoang, *Mal.*

Stirps valde variabilis, nunc trunco simpliusculo usque 30 (immo

50) ped. alto crus human. crasso basi tantum radicibus aëreis crassis sustenta et habitum *P. dubii* valde æmulans, nunc divaricato-adscendens, humilior, caudicibus furcato-divisis, radices aëreas crassas crebras emittentibus. *Folia* spiraliter trifaria, crasse coriacea, flaccida, 15-20 ped. longa, 4 poll. lata, acuminatissima, obscure viridia, subtus glaucescentia, lateribus rectangulariter devia, marginibus costâque subtus crassiuscula spinosa; spinæ usque 2 lin. longæ, complanatæ, curvatæ, apicem versus rectissimæ, virescentes, dein fuscescentes. *Spathæ* latolanceolatæ, crasse coriaceæ, acuminatissimæ, marginibus carinâque spinoso-ciliatæ, inodoræ. *Stamina* 8-14, palmato- v. fasciculatim connata; antheræ aristatæ. *Syncarpia* solitaria, $1\frac{1}{2}$ ped. longa, $\frac{3}{4}$ ped. crassa, v. racemosa, $\frac{1}{2}$-$\frac{3}{4}$ ped. longa, $\frac{3}{4}$ ped. crassa, elliptico-oblonga v. oblonga, carnescentia rubra v. testacea. *Drupæ* obconicæ, 5-6-gonæ, apice convexæ v. subplanæ; stigmata cornea, spinescente 2-3-furcata, rarius simplicia, fusca, nitentia.

It is remarkable that individuals which produce simple fruits constantly do so, and racemose fruits are also always borne on the same plants.

6. *P. labyrinthicus*, Kurz in Miq. Ann. Mus. Lugd. Bat. ii. 53. Alte fruticosus, 15-25-pedalis; caudices crebri, divaricato-ramosi, undique radices rectissimas inter se valde intricatas demittentes; folia anguste linearia, poll. lata, marginibus costâque subtus dense curvato-spinulosa, saturate viridia, lucida, subtus glauco-viridia; syncarpia racemosa, pendula, ovi anserini magnitudine, oblonga, carnescentia aurantiaca; drupæ apice convexæ, obconicæ, nitentes; stigmata plerumque falcata.

HAB. Along the coasts of western Sumatra, near Siboga and Baros, *Teijsmann!*; Tikoe, *Teijsmann*, *H. B. n.* 2121!

7. *P. nitidus*, Kurz. Fruticosus, 6-8-pedalis; caudices crebræ, radicibus aëreis quam caudices ipsæ crassioribus sustentæ; folia anguste linearia, $\frac{1}{2}$-$\frac{3}{4}$ poll. lata, marginibus costâque subtus remote recto-spinulosa, nitentia, saturate viridia; syncarpia solitaria, erecta, oblonga, casuarii ovi magnitudine, carnescentia, pulchre aurantiaca; drupæ apice convexæ, obconicæ, nitentes; stigmata simplicia v. furcata, sæpius curvato-elongata.—*Freycinetia nitida*, Miq. Ind. Sem. Hort. Amstelod. 1853-4; ejusd. Fl. Ind. Bat. iii. 172. *Pand. stenophyllus*, Kurz in Miq. Mus. Lugd. Bat. ii. p. 53.

HAB. In the hill jungles of western Java, common, from 3-4000 ft.!

This species is indeed very nearly allied to *P. labyrinthicus*. The fruit has much resemblance to a Pineapple.

SECT. III. MICROSTIGMA. *Drupæ simplices; stigmata sessilia v. subsessilia, reniformia, trigona v. subbiloba; filamenta connata; antheræ truncatæ (an in speciebus omnibus?).*

8. *P. graminifolius*, Kurz. Folia 1–1½-pedalia, 3–4-lin. lata, marginibus densius costâque subtus distanter spinulosa; spinulæ minutæ, rectæ; syncarpia (adhuc nimis juvenilia) erecta, elliptica, spathis oblongo-lanceolatis acuminatis spinulosis cincta; ovaria stigmatibus subsessilibus trigonis terminata.

HAB. Tenasserim, *Helfer, n.* 6029!

The leaves have some resemblance to those of *Freycinetia leucacantha*, Miq. The specimens before me are not sufficient to draw up a more complete description.

9. *P. ceramicus*, Rumph. Fl. Amb. iv. 149. t. 79; Kunth, Enum. Pl. iii. 98; Miq. Fl. Ind. Bat. iii. 162. Fruticosus, 4–5- usque 25-pedalis, caudicibus spinescente tuberculosis; folia flaccida, e basi angustatâ lanceolata, subplana, marginibus costâque subtus distanter virescente spinulosa, e plumbeo atro-viridia; syncarpia dein pendula, carnescentia, rubra, elongato-elliptica, trigona, 1–1½-pedalia; drupæ apice convexiusculæ, obconicæ; stigmata trigona, inflexo-depressa.—*P. conoideus*, Lam. Encycl. i. 372.

HAB. Moluccos, *Rumph.*, *Teijsmann!*

Caudex (in Hort. Bogor. 4–5) in loco natali usque 25-pedalis, divisus, brachium crassus, cicatricatus, tuberculis numerosis majusculis spinâ terminatis obsitus, viridis v. fusco-viridis, radicibus aëreis pollicem crassis dense crasseque tuberculatis sustentus. *Folia* remotiuscule spiraliter trifaria, coriacea, 4–5 ped. longa, e basi angustatâ 2 poll. latâ lanceolata, apicem versus dilatata, 3–4 poll. lata, subplana, brevi acuminata, trinervia, supra obscure viridia, in colorem plumbeum v. cyaneum vergentia, subtus glaucescente viridia, marginibus costâque subtus plus minus distanter spinulosa; spinulæ lineam longæ, curvatæ, virescentes. *Flores masc.* ignoti. *Syncarpia* solitaria, erecta, dein nutantia, 1–2 pedes longa, 2–2½ poll. crassa, elongato-elliptica, obtuse trigona, obtusa, matura crocea. Drupæ ½–1½-pollicares, elongato-obconicæ, irregulari 5–6-gonæ, apice convexiusculæ, maturescentes inter se pulpâ aurantiacâ conglutinata; stigmata plerumque lateraliter erumpentia, trigona, subsessilia, inflexo-depressa v. obliqua.

Nom. Vern. Sa-un, *Mal.*

10. *P. humilis*, Rumph. Fl. Amb. iv. 143. t. 76; Jacq. Fragm. xxi. t. 14. f. 2?; Willd. Sp. Pl. iv. 645; Kunth, Enum. Pl. iii. 99; Hassk. Cat. 60?; Miq. Fl. Bat. iii. 160; Kurz in Miq. Ann. Mus. Lugd. Bat. ii. 53. Fruticosus, usque 10-pedalis; folia linearia, flaccida, marginibus costâque subtus a medio albido-spinulosa, glaucescente-viridia, vix nitentia; antheræ truncatæ; syncarpia racemosa, ovi gallin. magnitudine, carnescentia, aurantiaca; stigmata subsessilia, subreniformia.—*P. polycephalus*, Lamk. Encycl. i. 372. *P. montanus*, Bory, It. t. 313? *P. pygmæus*, Hook. in Bot. Mag. 4736; Walp. Ann. v. 857.

Hab. Moluccos!; western Java in the forests of the hills up to 2–4000 ft. frequent!

Distr. Bourbon.

Nom. Vern. Sarengseng-besár, *Mal.*

Tab. LXIII.—Fig. 1. Male inflorescence. Fig. 2, 2. Stamens. Fig. 3. Upper part of a leaf, with tranverse section (4).

11. *P. latifolius*, Rumph. Fl. Amb. iv. t. 78 (♂); Hassk. Cat. Bog. 60; Miq. Fl. Ind. Bat. iii. 164. Fruticosus, usque 10-pedalis, robustus; folia flaccida, lutescente-viridia, e basi complicato-angustatâ lanceolata, subplana, brevi acuminata, marginibus costâque subtus sursum tantum parce spinulosa.—*P. amaryllifolius*, Roxb. Fl. Ind. iii. 743; Kunth, Enum. Pl. iii. 100; Miq. Anal. Ind. iii. 17; ejusd. Fl. Ind. Bat. iii. 164. *P. odoratissimus*, Blume in Cat. Buitenz.

Hab. Moluccos!

Humilis, prostratus v. robustus, fruticosus et 10-pedalis, caudice erecto brachio crasso ramoso canescente radicibus aëreis sustento. *Folia* spiraliter trifaria, 4 ped. longa, 3–4 poll. lata, in sicco odora, subinermia, apicem versus tantum spinulis rectis minutis munita.

I place this species here in this section on account of the similarity of the male inflorescence, figured by Rumphius, to that of *P. humilis.*

Nom. Vern. Pandan rampé, *Mal.*

Sect. IV. Keura. *Drupæ in phalanges connatæ; stigmata sessilia, peltata v. paullo elongata, depresso-subspinescentia; filamenta connata; antheræ aristatæ.* (Keura, *Forsk.*; Arthrodactylis, *Forst.*; Marquartia, *Hassk.*; Hasskarlia, *Walp.*; Doornia, *De Vriese.*)

12. *P. Leram*, Jones in Voigt. Cat. Hort. Calc. 683. Arboreus, usque 30–70-pedalis; folia marginibus costâque subtus tenuiter-spinulosa,

acuminata, obscure viridia; syncarpia globosa, capitis hum. v. peponis majoris magnitudine, solitaria, dein aurantiaca; drupæ 3–15-næ in phalanges magnitudine variantes connatæ carnescentes; stigmata obliqua, irregularia, depressa, membranaceo-producta, dein sæpius indurata, pungentia.—*Millori s. Nicobar Breadfruit*, Fontana, Asiat. Res. 161. c. tab. (*satis bona!*).

HAB. Nicobar islands!; on the Andaman islands, very common in the jungles!

Var. β. *macrocarpa;* syncarpiis peponis majoris phalangibusque pugni magnitudine in sicco medulloso-fibrosis.

HAB. As the former.

Arbor caudice brach. crus human. crasso canescente simplice apice furcato-diviso usque 60–70-pedali basi vix radiante habituque omnino *P. furcato* simillima. *Folia* coriacea, spiraliter trifaria, saturate viridia, juniora plerumque lucida et nigrescente maculata, 15–18 ped. longa, 4–5 poll. lata, marginibus deviis costâque subtus tenuiter spinulosa; spinulæ curvatiusculæ v. rectæ, albidæ, apice sæpius fuscidulæ. *Syncarpia* solitaria, ovalia v. globosa, capitis hum. usque peponis majoris magnitudine, cernua; drupæ per 6–2 (in var. β. per 18–15) in phalanges turbinatas sæpius rhomboideo-compressas et inter se sæpe rimoso-scissas connatæ, apice deplanatæ, dein aurantiacæ, carnescentes; stigmata oblique depresso-trigona, lamellato-producta, dein macerata, sæpe pungente-acuminata.

NOM. VERN. Mangdaf, *And.*

The Andamanese aborigines eat the under part of the phalanges as well as those of *P. verus*, which is soft and fleshy. The seeds of both are much prized as food.

EXPLANATION OF PLATES LXII. AND LXIII.

TAB. LXII.—Figs. 1 and 2. Drupes of *Pandanus caricosus*, Rumph., the latter somewhat magnified. Fig. 3. Stamens of the same. Fig. 4. A fruit of *Pandanus fœtidus*, Roxb. Figs. 5 and 6. Drupes of the same, the latter cut longitudinally, natural size. From Roxburgh's drawings.

TAB. LXIII. *Pandanus humilis*, Rumph.—Fig. 1. Male inflorescence, half size. Fig. 2, 2. Stamina, magnified. Fig. 3. Upper part of leaf, showing the transverse section at the base (4).

(To be concluded in next number.)

ON SOME PLANTS OBSERVED IN ICELAND IN JUNE, 1861. *

By Isaac Carroll.

My stay in Iceland was limited to about eight days in all; five of which were spent in an excursion to the Geysers from Reykjavik, and three days at Akreyri, in the north. It was impossible to do a great deal in so short a time, yet I succeeded in finding three or four Phænogams, and several Cryptogams, which had not been recorded in the previously published Floras which have come under my observation. (The names of such species are printed in italics in the following list.)

I need not remark on the well-known barrenness and desolation of Iceland, but I may observe that vegetation was more abundant and more forward at Akreyri than in the vicinity of Reykjavik, and I am convinced that a few weeks or months spent in the north or north-west parts of the island would yield a rich harvest to a careful botanist. The most remarkable thing about the Icelandic flora is its strikingly *Arctic* character, shown by the absence of trees, and the occurrence at or near the sea level of plants, which in Norway and Lapland (at a much higher latitude) are usually found at considerable elevations. The number of Lichens appears to be very small, the lava being nearly destitute of these plants. I saw none of the larger *Parmeliæ*, but *Cetraria Islandica* is found in great quantities on the deserts of the interior, and if the flat-topped basalt mountains of the north-west were properly examined, a greater variety might no doubt be obtained. Mosses are common enough in wet spots, the species being mostly identical with our British ones.

Ranunculus glacialis, *L.* On a high mountain over Akreyri, Eyjafjord, at the snow-line.

R. pygmæus, Whlnb. With the preceding. Since found (in 1862) at Hólar, by Sabine Baring-Gould.

Papaver nudicaule, *L.* With the above, on rocks.

Arabis alpina, *L.* Sparingly in the south, and on the mountains over Akreyri.

A. petræa, *Lam.* Common on the deserts near Reykjavik.

Draba hirta, *L.* (rupestris, *Br.*) Frequent at a low elevation.

D. incana, *L.* Ditto.

D. verna, *L.* Bank near Akreyri.

Viola tricolor, *L.* Banks at Akreyri, abundant.

Lychnis alpina, *L.* Not unfrequent.

Alsine rubella, Whlnb. Not rare on the deserts.

A. biflora, *Whlnb.* Mountain over Akreyri, near the snow-line.

Arenaria Norvegica, *Gunn.* Frequent on bare ground at a low elevation.

Cerastium trigynum, *Vill.* High mountain over Akreyri.

Stellaria graminea, L. *var.* Near Akreyri.

Lathyrus maritimus, *Big.* By the Lake of Thingvalla, young plants just coming up.

Sibbaldia procumbens, *L.* Mountain over Akreyri.

Epilobium alsinifolium, *Vill.* = E. origanifolium, *Lam.* Mountain over Akreyri.

Epilobium latifolium, *L.* Ravine near Akreyri.

Sedum Rhodiola, *De Cand.*

S. villosum, *L.* Geysers, and near Akreyri.

Saxifraga oppositifolia, *L.* Mountain over Akreyri.

S. cæspitosa, *L.*, *true pl.* Frequent, usually at a low level.

S. cernua, *L.* Near Eyjafjord.

S. rivularis, *L.* Allmannagja, and mountain over Akreyri.

Galium pusillum, *L.* Frequent on the deserts. Fl. white, with a yellowish shade.

Erigeron alpinus, *L.* Akreyri.

Gnaphalium supinum, *L.* Mountain over Akreyri.

Hieracium cæsium, *Fr.* Near Eyjafjord. (A Hieracium, just like H. iricum, occurred on the hill behind the Geysers, but it was not in flower.)

Andromeda hypnoides, *L.* Sparingly in the south, but abundant on the mountains over Akreyri. Fl. very beautiful, pale lilac, waxy.

Loiseleuria procumbens, *Desv.* Rather frequent.

Veronica saxatilis, *L.* Near Eyjafjord.

V. alpina, *L.* Mountain over Akreyri.

Bartsia alpina, *L.* Mountains over Akreyri.

Pedicularis flammea, *L.* Ditto.

Polygonum viviparum, *L.* Akreyri.

Oxyria reniformis, *Hook.* Ditto.

Betula subalpina, Larss. Th. M. Fr. This is the shrub or small tree of which the so-called "Icelandic forests" are chiefly composed. It grows about 4–8 feet high. Its affinity is with B. alba, *L.*, rather than B. nana, *L.*, but it is quite distinct from both. My specimens were unfortunately too immature for Dr. Fries to speak with absolute certainty about them.

B. nana, *L.*, is found with B. subalpina, and on the mountains over Akreyri, in plenty.

Salix lanata, *L.* This shrub, which I did not happen to meet with in Norway or Lapland, is very frequent in Iceland.

S. arctica, *Pall.* This fine species which is not rare in Iceland, seems to be unknown on the European Continent.

S. phylicifolia, *L. var.* In damp places between Reykjavik and the Geysers.

Habenaria viridis, *Br.* Mountains over Akreyri.

H. albida, *Br.* Ditto.

Platanthera hyperborea, *Lindl.* Ditto.

Tofieldia palustris, *L.* Geysers, and near Akreyri, plentiful.

Juncus Balticus, *W.* Marshes near Akreyri.

J. triglumis, *L.* Ditto.

J. trifidus, *L.* Ditto.

Luzula spicata, *De Cand.* Ditto.

L. arcuata, Hook. Ditto.

Carex rigida, *Good.* Iceland, frequent.

C. rupestris, *All.* Akreyri.
C. atrata, *L.* Ditto.
C. capillaris, *L.* Ditto.
C. alpina, Vahl. Ditto.
Kobresia scirpina, *W.* Ditto.
Eriophorum Scheuchzeri, *Hoppe.* Marshes frequent.
Phleum alpinum, *L.* Akreyri.
Poa cæsia, *Sm.* Ditto.
Trisetum subspicatum, *Brown.* Mountain over Akreyri.
Lycopodium selaginoides, *L.* In the Allmannagjâ.
Equisetum umbrosum, *Willd.* (E. sylvaticum, *Hook. Icel.*?). Frequent.
E. palustre, *L.* Akreyri.
E. variegatum, *L.* Thingvalla, and near Akreyri.
Woodsia ilvensis, *Br.* Allmannagjâ.
Andreæa rupestris, *L.* Mountain over Akreyri.
Sphagnum acutifolium, *Ehrh.* Bogs.
Weisia crispula, *Hedw.* Mountain over Akreyri.
Dicranum gracilescens, W. et M. γ. *tenellum*, Wils. Mountain over Akreyri.
Distichium capillaceum, *B. et S.* Ditto.
Grimmia ovata, *W. et M.* Mountain over Akreyri.
Encalypta rhabdocarpa, *Schw.* Mountain over Akreyri.
Schistidium apocarpum, *B. et S. var.* gracile, *Wils.* Mountain over Akreyri. A beautiful form, rich brown, stems nearly simple, tufted, like Grimmia spiralis.
Racomitrium canescens, *Brid.*
R. lanuginosum, *Brid.* This species is extremely common on the older lavas, which in many places are quite grey with it.
Pogonatum alpinum, *Brid.*
Polytrichum sexangulare, *Hoppe.* Mountain over Akreyri.
Aulacomnion palustre, *Schw.*
Leptobryum pyriforme, *H. et W.* Akreyri.
Bryum Duvalii, *Voit.* Mountain over Akreyri.
B. cæspiticium, *L.* Akreyri.
Bryum turbinatum, *Hedw.* Akreyri.
B. carneum, L. Ditto.
B. pseudotriquetrum, Schw. Ditto.
B. intermedium, Brid. Ditto. "Fl. synoicous," *Wils.*
B. pallescens, Schw. Ditto.
B. inclinatum, B. et S. Ditto.
B. Ludwigii, Spr., var. *gracile*, Schl. Mountain over Akreyri.
B. uliginosum, B. et S. Akreyri.
Meesia uliginosa, *Hedw.* Ditto.
Mnium hymenophylloides, Br., Eur., Wils. (probably). Mountain over Akreyri.
Funaria hygrometrica, *Hedw.*
Bartramia fontana, *Brid.*
B. ithyphylla, *Brid.* Mountain over Akreyri.
Conostomum boreale, *Sw.* Ditto.
Timmia austriaca, Hedw. Mountain over Akreyri.
Tetraplodon mnioides, *B. et S.*
Climacium dendroides, *W. et M.*
Leskea sericea *Dill.*, *var.* Mountain over Akreyri.
L. moniliformis, *Whlnb.* Ditto.
Hypnum exannulatum, Br. Eur. Akreyri.
H. cordifolium, *Sw.*
H. commutatum, Dill., var. *condensatum*, Wils. Akreyri.
Marchantia polymorpha, *L.* Ditto.
Gymnomitrium concinnatum, *Corda.*
Stereocaulon tomentosum, *Laur.*, *var.* alpinum, (*Laur.*) *Nyl.* Rather frequent.
Neuropogon melaxanthus, (*Ach.*) *Nyl.*

Mountain over Akreyri. (This fine Lichen occurs also in Spitzbergen, but not in Lapland.)

Alectoria ochroleuca, (*Ehrh.*) *Fr.*, β. cincinnata, *Fr.* Frequent.

Cetraria Islandica, *L.* Near Akreyri, sparingly.

Platysma nivale, (*L.*) *Nyl.* Frequent.

P. Fahlunense, (*L.*) *Nyl.* Mountain over Akreyri.

Parmelia lanata, (*L.*) *Nyl.* Ditto.

Physcia cæsia, (*Hffm.*) *Nyl.* On lava blocks.

P. obscura, (*Ehrh.*) *Nyl.* Akreyri.

P. lychnea, (Ach.) Nyl. Ditto.

Umbilicaria arctica, (*Ach*) *Fr.*

Squamaria gelida, (*L.*) *Nyl.* On lava.

Lecanora aurantiaca, (Lightf.) Nyl. On lava and basalt, South of Iceland.

L. subepulotica, Nyl. Ditto. On lava sent by Dr. Hjaltelin.

L. subfusca, *Ach.*, *var.* atrynea, *Ach.* Krisuvik.—Herb. Carroll.

L. badia, Ach. f., *cinerascens*, Nyl. On a boulder near Akreyri.

Lecidea decipiens, *Ach.* South of Iceland.

L. sabuletorum, *Flk.*, *var.* milliaria. Akreyri.

L. sabuletorum, *Flk.*, *var.* simplicior, *Nyl.* Mountain over Akreyri.

L. parasema, Ach. On lava or basalt, sent by Dr. Hjaltelin.

L. petræa, Ach., var. *excentrica*, Ach. On lava, sent by Dr. Hjaltelin.

L. Œderii, Ach. Ditto.

L. panæola, Ach. Ditto.

Verrucaria margacea, *Whlnb.*, *var.* æthiobola, *Wahl.* On pebbles near Akreyri, etc.

ON *LIQUIDAMBAR FORMOSANA*, *Hance.*

BY H. F. HANCE, PH.D., ETC.

Amongst a small collection of plants sent me from Formosa by the late Mr. Richard Oldham was a fine *Liquidambar*, found growing in some abundance in the forests around Tam-sui in April, 1864. This species is the more interesting from belonging strictly to the genus as lately circumscribed by Professor Oliver, who has revived *Altingia*, of Noronha, for the other two East Asiatic species, *L. altingia*, Bl., and *L. Chinensis*, Benth. It has been described by me, under the name at the head of this article, in a paper on new and critical Chinese plants, printed in the Paris 'Annales des Sciences Naturelles,'* the publication of which was long unavoidably delayed from causes independent of my control. The leaves have usually three (with more rarely two additional abbreviated basal) lobes, and these are gradually produced from a very broad base into a much attenuated acumen, and are not dis-

* Annales des Sc. Nat., Botanique, sér. 5, vol. v. p. 215; March, 1866.

similar to those of *Acer truncatum*, Bge., or *A. mono*, Maxim. In June, 1864, Mr. Sampson discovered the tree in woods along the West River, in the province of Kwang-tung; and in April of the present year again met with it about 25 miles S.W. of Canton, in the neighbourhood of the celebrated natural caverns of Sai-chü-shan, which tunnel the hills for many hundreds of feet in all directions, attain a height of 150 feet, and contain pools of very great depth. The rock of these caverns is described by Mr. Sampson as "evidently of igneous origin, and as apparently a brecciated rock of the trappean series, half composed of fragments of feldspathic rock, with some of hornblende and other volcanic productions, and a slight trace of carbonate of lime in minute vesicles at the junction of some of the imbedded fragments and the matrix." The tree, which is known to the Chinese by the name of "Ka-fung-lut," or false Chestnut,—doubtless from some resemblance in the fructiferous capitula,—was here planted along the road, its leaves affording nutriment to the lava of a moth which produces a coarse but strong and durable silk, collected by a monopolist who farms the right from the authorities. It is worthy of remark that two of the most beautiful of American moths, *Phalæna luna* and *P. imperatoria*, feed on the leaves of *L. styraciflua*. (Loudon, Arb. and Frutic. Brit. iv. 2052.)

Being desirous of obtaining living specimens of the tree, a Chinese was commissioned to procure them; but the plant he brought, young and without inflorescence, differed so much in aspect,—the leaves having their lobes less divaricate in direction, narrowed instead of broader at the base, less acuminate, and the basal ones more developed, and the principal nerves being densely hairy, and not smooth as in the Formosan specimens and those first gathered by Mr. Sampson,—that I was unable to believe that the two could be conspecific. In September last, however, in an excursion I made with Mr. Sampson up the North River to the Tsing-yune Pass, about 120 miles above Canton, in the magnificent dense woods encompassing the renowned Buddhist monastery of Filoi-tsz,—which, let me note, *en passant*, is said, like the house of Our Lady at Loreto, to have been transported bodily, by a special miracle, from its former site to the beautiful locality it now occupies at the river-margin of the deep forest-clothed gorge,—we found this handsome tree growing on micaceous schist in great abundance, though at that season without flower or fruit, and

exhibiting in the same individuals such variations in the form of the leaves, and differing so much in the absence, presence, and amount of pubescence, and in its being confined to the ribs, extended to the whole under-surface, and even sometimes densely clothing the petioles and branchlets, that the identity of the Formosan and continental plants was at once evident.

To sum up what further is known of its distribution I must add that it grows in the neighbourhood of Canton, though only seen in a twiggy osier-like form, doubtless owing to its being cut down for fuel; that Mr. Swinhoe informs me it is found in woods some miles above Amoy, where it is called "Chee-pong;" and that, to judge from a rough pen-and-ink sketch sent me several years ago by Capt. Eustace W. Jacob, and marked "Pahm-pon," I believe it is also a native of Chu-san.

A careful examination of the three or four fruiting and numerous sterile specimens I possess has led me to the unexpected conclusion that the Chinese tree cannot be separated specifically from the North American *L. styraciflua*; and, if this opinion is well founded, the fact is perhaps scarcely inferior in interest to Dr. Hooker's identification of the Macedonian *Pinus peuce*, Griseb., with the *P. excelsa* of the Himalayas. Unfortunately, I have not access at present to specimens of either that or the Oriental Sweet-gum tree; but, on a minute comparison with the plate of the former given by Hayne in his 'Arzneikunde' (fasc. xi. t. 25), which is specially lauded for its accuracy by M. Alphonse De Candolle, I can detect no difference at all, except that in *L. styraciflua* the leaves, which are otherwise smooth, have the axils of the nerves on the under surface conspicuously bearded. But, setting aside the diversities presented by the Chinese tree, it is surely impossible to assign much value to this characteristic, although, indeed, *L. orientalis* is exclusively distinguished from the Atlantic species by its glabrous leaves. (Lindley, Med. and Econ. Bot. 73; A. DC. Prod. xvi. sect. 2. 158.*) In *Platanus*, which Th. F. L. Nees, Endlicher, A. Bronguiart, Meissner, Horaninow (Tetractys Nat.), Grisebach (Grundr. d. Syst. Bot.), and J. G. Agardh (Theor. Syst. Nat.)

* Professor A. Gray, however, says of *L. styraciflua*, "leaves smooth and shining," with no mention whatever of pubescence. (Man. Bot. N. U. S. second edition, p. 148.)

concur in placing next *Liquidambar*,* the oriental and occidental Planes, which, it may be observed, have respectively a very similar geographical distribution to the corresponding Sweet-gum trees, are so much alike that M. Spach, who cannot justly be charged with any undue leaning to synthetic views, unhesitatingly unites them (Ann. Sc. Nat. Ser. 2. xv. 291), remarking on the varieties he admits, and italicizing the words for the sake of emphasis, "Les caractères par lesquels j'essaie de les distinguer ne sont que ceux qui se rencontrent le plus fréquemment sur le même individu;" and he adds that between these are numerous intermediate subvarieties which it is impossible to define. For my own part, I own I cannot resist the conclusion that in both instances the reputed species are merely derivative forms; and there can be little doubt, I apprehend, that had these been found growing in one country, the majority, at least, of botanists would never have thought of distinguishing them. I may add that the researches of all monographers possessing comprehensive views on our forest trees,—as, for instance, Oaks (A. DC. Prod. xv. sect. 2), Poplars (Spach, Ann. Sc. Nat. Ser. 2. xv. 28), Willows (Fries, Nov. Fl. Suec. Mant. i.; Andersson, Sal. Lappon.), Birches and Alders (Regel, Monogr. Betulac.),—convincingly establish the fact that the presence, absence, or amount of pubescence on the foliage cannot be regarded as a specific character.

Zuccarini records a *Liquidambar*, merely, however, from Von Siebold's notes, as occurring in Japan; but, though I have been privileged to receive from the Imperial Gardens at St. Petersburg one of the finest and most complete sets of the very beautiful collections made in that country and in Mandshuria by the accomplished author of the 'Flora Amurensis' the species does not occur therein, nor was it detected by Mr. Charles Wright. Hence it is uncertain whether Siebold's plant was an *Altingia* or a *Liquidambar*. The affinity of the Atlantic-American and Japanese Floras would rather point to the

* I am aware that Mr. B. Clarke, in his recently published 'New Arrangement of Phanerogamous Plants,' has expressed a widely different opinion on the real affinities of *Platanaceæ*, but his very original views have yet to be subjected to close and detailed criticism. I may add, without any disrepect to the writer, that the principles on which his classification reposes have scarcely been set forth in as clear and well-digested a shape as could be wished. In this repect, though expository of a very faulty and even crotchety arrangement, I know of no more admirable model than the Introduction to Dr. Lindley's 'Vegetable Kingdom.'

latter. I have already in this Journal (iii. 340) recorded the occurrence in the south of China of *Cryptotænia Canadensis*, DC., heretofore only found in the Atlantic States and Japan; and, in addition to the species common to the latter country and southern China, enumerated in Mr. Bentham's 'Flora Hongkongensis,' I can adduce two additional instances in *Haloragis micrantha*, R. Br., found by Mr. Sampson on the "White Cloud" hills in the immediate vicinity of Canton, and in *Carex tristachya*, Thbg. (=*C. monadelpha*, Boott, *ipso teste!*), detected by me on damp ledges of rocks in Dane's Island, Whampoa. Though, therefore, the isolated appearance of *Liquidambar styraciflua* in south-eastern China would be a surprising fact, there would be no *à priori* improbability of its occurrence here when once its existence in Japan was demonstrated, as I do not doubt will be the case. Indeed, when it is borne in mind that of the fifteen genera and about thirty species comprised in *Hamamelidaceæ* the small island of Hongkong—of less area than the Isle of Wight—contains five genera, each represented by a single species; that four genera and six species are known as natives of Japan; and that, in addition to the two Liquidambars above noticed I have described a very distinct *Corylopsis* from Fokien,—it is evident that eastern Asia is the focus of the Order which, it may safely be predicted, will receive many more accessions from thence, in new forms too, doubtless, since one-third of the known genera are monotypic and the remainder represented by very few species.

Considering the geographical position of Japan, and the great number of plants which recent researches have shown to be common to that country and Mandshuria, it is singular that no *Hamamelidaceæ* should hitherto have been detected in the last-named country, including the vast territories watered by the Amur, Sungari, Schilka, and their affluents, in Mongolia, or even in northern China. Such, at least, I find to be the case after a very careful examination of the several invaluable works on the Flora of those regions, for which we are mainly indebted to the industry and learning of Russian botanists.

Whampoa, S. China,
November, 1866.

ENUMERATION OF AUSTRALIAN LEMNACEÆ.

By S. Kurz, Esq.

Some time ago, Dr. Ferdinand Mueller, in Melbourne, favoured me with a small collection of *Lemnaceæ* from that distant part of our globe, requesting me at once to publish the determinations in any Journal. I have now the pleasure to communicate the result.

Of the four species (the only ones until now become known), two are cosmopolitan forms, one is found also on the Fiji islands, and the fourth seems to be peculiar to Australia.

Lemna, *Linn.*

§ 1. *Lemna*, Auct.

1. *L. minor*, Linn.

Australia Felix, *F. Mueller !*; New Zealand, *J. D. H.*; Fiji islands, *Seemann, n.* 657 !; Tasmania, *Gunn !*

2. *L. pleiorrhiza*, F. Muell. Frondiculæ oblongæ, supra (in sicco) papillosæ, crassiusculæ, marginibus purpurascentibus, pleiorrhizæ.

Frondiculæ 1–1½ lin. longæ, lin. latæ, colore *L. polyrrhizæ* verisimiliter gaudentes. Radices 4–5, pallidæ, crassiusculæ, 1–1½ poll. longæ.

Murray river, *F. Mueller !*

This species is distinguished from my *L. oligorrhiza* by the greater number and strongness of the roots, which are much shorter, the papillose surface of the fronds, which are not concatenate, etc.

There are a few fronds, collected in Australia Felix, differing from this species in their size, being nearly three times larger, and also in their stronger texture. The specimens however are too incomplete to say anything about.

3. *L. melanorrhiza*, F. Muell. et Kurz. Frondiculæ convexiusculæ, texturæ *L. polyrrhizæ*, oblongæ v. subrotundæ, subtus spongiosæ, mono-di-rhizæ, radiculis nigrescentibus v. bruneis.

Frondiculæ in speciminibus Australicis 2 lin. longæ, lineam latæ, colore *L. polyrrhizæ*; radiculæ longissimæ, rigidulæ, in sicco nigræ.

Western Australia, *F. Mueller !*; Fiji islands, *B. Seemann, n.* 656 !

This species differs from all others in the long black or brown roots, and is therefore easily to be recognized. Dr. Seemann's specimens are nearly three times larger, but otherwise not different.

§ 2. *Staurogeton*, Rchb.

4. *L. trisulca*, Linn.—Murray river, *F. Mueller!*; New Zealand, *J. D. H.*

P.S. Since the publication of my Indian *Lemnaceæ*, in Linn. Proceed. ix. p. 264, Dr. H. Trimen has pointed out, in this Journal (vol. iv. p. 219), the identity of *Wolffia Delilii* and *W. Michelii*, Schleid. (*W. arrhiza*, Wim.), with which I quite agree. I add to that enumeration the following stations of several species, which have only now come to my knowledge:—*Wolffia Michelii*, Schleid., at Chotapooni in Assam, *Masters!* *Telmatophace gibba*, Schleid., Afghanistan, *Griff. n.* 5615! Banda, in ponds, *Edgew.* *Lemna oligorrhiza*, Kurz, Assam, *Masters, n.* 540! *Lemna polyrrhiza*, L., Assam, *Masters, n.* 503.

OBSERVATIONS ON THE INTRODUCTION AND CULTIVATION OF THE ORANGE-TREE IN NEW SOUTH WALES.

By George Bennett, M.D., F.L.S., etc.

It has an attractive sight to a visitor or resident in the colony, who takes any interest in the naturalization of choice fruit trees in New South Wales, to visit the extensive orangeries and other fruit gardens near Paramatta, and in other districts of the colony. Oranges, Lemons, Apples, Pears, Loquats, Apricots, Peaches, and other excellent fruits, together with extensive vineyards, stocked with superior varieties of grapes, may be seen growing in the greatest luxuriance. When the question is asked, what is the use of acclimatization? the appearance of the gardens just mentioned, over which the eye luxuriates, filled with vigorous healthy trees in full bearing, will be the best reply; at the same time we must consider that this result was not obtained without great labour and difficulties, but were all overcome by perseverance and the study of the most suitable soils and situations,—the experiment terminated in success, the trees became naturalized, were readily propagated, and, after many years, the result has been a source of great wealth to the colony; the produce finding a ready market both for exportation as well as for home consumption.

My attention was directed to this subject by a visit I recently made,

in the commencement of December, 1866, in company with Dr. Fyffe and Mr. C. Moore, of the Botanic Gardens, to the extensive and fertile orangery, the property of Mr. James Pye, near Paramatta. It is situated on a point of land known as the Governor Arms, immediately on the south side of a creek, running from Castle Hill into the head of the Paramatta river, and the fruit trees grow on the slopes, as well as on level ground. I observed that the Orange, Apple, and Lemon trees (forming the majority of the fruit trees in the gardens) were in a most healthy state, and thriving in the greatest luxuriance, in a soil consisting of *a very poor sandy loam soil, from which cropped out over the whole of the land, large sandstone rocks,* the trees being planted around and between them. The situation was sheltered, and the whole extent of the fruit gardens was twelve acres, divided into three paddocks or enclosures, and the neatness and order of the ground, and the perfection of the trees in growth and bearing excited our admiration. I remarked in the Azores or Western Islands, that the soil is volcanic and generally a friable loam, and many of the orange gardens were formed in places where there was often not a depth of soil greater than 18 to 20 inches above the shattered mass of rubble and rock which had been thrown together by volcanic action. The Orange-trees at Mr. Pye's were still loaded with ripe fruit, and a quantity of a second crop, as yet small and immature, were on many of the trees; for there are often three crops of oranges during the year. In many instances the fruit of each crop differs in form and size, but are all of excellent flavour. I remarked that the oranges were of a dark reddish-orange colour, of a deeper hue than I had usually seen them,—whether this was from the advanced state of the season or other causes, I could not determine; a quantity of oranges, from this garden, were lying in heaps in the outhouse, ready for packing, as well as a number of well-filled boxes prepared for transmission to Sydney. A large quantity of oranges are exported to Tasmania, Melbourne, and other of the southern ports of Australia, and also to New Zealand. There is a dark-skinned orange often seen on the trees, which hue is occasioned by a species of fungus being developed on the rind; it is called the "Black or Maori orange" by the growers; at first sight its dark colour occasions it to be rejected as unsound, but, when tasted, it is found to be of as luscious flavour as any of the oranges of the normal colour on the tree, and it is considered excellent for keeping. In these gardens there were few very young

Orange-trees, which can be distinguished at a short distance by their stiff clumpy form; for most of the trees had attained a height when the full beauty of their rich green foliage had been developed, and were richly laden with drooping clusters of golden fruit. Some of the oranges, Mr. Pye informed us, had remained fifteen months on the trees, and, when gathered, were found sound, juicy, and sweet; on tasting some of them the result was very satisfactory. The Apple-trees growing intermingled with the Orange-trees in this poor soil, consisted of Russet, Winter, Pearmain, Red Streak, Quarrenden, and other varieties; they were healthy and in full bearing, but the fruit was not yet ripe; it is more than might have been expected to see the Apple and Orange flourishing side by side. The Lisbon Lemon-trees were bending under the weight of fruit of large size; among some we gathered, three were weighed; the first weighed 19 ounces, the second, 17½ ounces, and the third, 14 ounces; when cut, they were firm, juicy, and in excellent condition. The varieties of the Orange in this garden were Navel, Mandarin, the Common, and a few of the Seville, Citrons and Limes. Although the whole of the excellent fruit trees before mentioned, grew with the greatest luxuriance in this poor soil, yet I was informed that stone-fruit would seldom last longer than three years after bearing. Many of the Orange-trees were from 20 to 25 feet high, and the wide-spreading branches and dense foliage afforded a cool and agreeable shelter; these trees were twenty years old. The trunk of one we measured was 4 feet 1 inch in circumference, 1 foot from the ground, and 3 feet 10 inches, at 4 feet from the ground. Near them were some seedlings of large growth, nine years old, the fruit from which had not yet been gathered. Seedling trees are considered by orange growers, in Europe, to be far less liable to the attack of insects than those raised from layers. The trees in this orangery were occasionally refreshed by fresh soil, to replace that which had been washed away by heavy rains, and, at certain intervals of time, some bone-dust was applied as a manure. From the situation of the gardens, the roots of the Orange and other fruit trees appeared to be well drained, and, from the nature of the soil, it was not likely that water would accumulate at the roots, which so often cause the destruction of the trees, more especially when the soil is clay, and the drainage not attended to. The magnificent Orange-trees, celebrated for their noble size, beauty of foliage, and profuse bearers of rich

luscious fruit, were now before us, one of the objects of our visit; and the accounts we had received of them were certainly not overrated; indeed, it is only by actual inspection and attentive examination that an opinion can be formed of them. It is seldom that in orange-growing countries, trees are seen of this magnitude. The photograph, taken by Degotardi, for the Paris Exhibition of 1867, although very accurately done, does not convey the appearance of the original in the graceful drooping of the dense foliage, the delicate tints of colour from a dark to the lightest hue of green, the light and shade of the leaves being contrasted by the rich colour of the ripe and ripening fruit. This is all lost in a photograph; the general appearance of these beautiful vegetable productions can only be obtained by a drawing in water-colours by an artist accustomed to sketch from nature, and who would succeed in delineating their natural beauties; the lofty and rugged sandstone rocks on the opposite side of the creek, forming a background, would afford a good relief to the picture; this portion is well brought out in the photograph. These fine trees are now forty years old, and although of full growth and mature age, were covered with a luxuriant bright foliage, the bark smooth and healthy, young slender stems branching in all directions, indicating a vigorous and robust state of health, and bearing large crops of fruit every year. An agreeable shade was obtained under the extensive branches, where several persons could find a pleasant and cool retreat from the heat of the sun. The highest of the two trees that were most remarkable for their size was 35 feet, and the other was 30 feet high, but it surpassed the former in the circumference of its branches, which, by actual measurement, were 33 feet in diameter from the extremities of the branches. The first tree bifurcates a few feet from the ground, and, below the bifurcation, at a foot from the ground, the trunk measured five feet in circumference. The circumference of the lower part of the bifurcated stems was, the first, 3 feet 3 inches, and the second, 2 feet 10 inches. The fresh vivid green of the foliage, and general healthy appearance of these, as well as all the Orange and other fruit trees in these extensive and well-planted gardens could not but excite our admiration. The gardens are situated on the banks of the creek, at an elevation varying from 25 to 30 feet. Loquat, Pomegranate, Quince, and other fruit trees, were planted in the gardens, but Orange, Lemon, and Apple trees, of luxuriant growth, formed the largest portion of the fruit trees, producing a sight rarely if ever seen in any other climate in the world.

In August last I visited the orangery of Mr. A. T. Holroyd, at "Sherwood," near Paramatta; it was a very young orchard in comparison with that of Mr. Pye, but it was in an excellent and flourishing state. The orangery consisted of thirteen acres, on which there are 850 trees planted, having 70 trees to the acre. Ten of the trees, he informed me, yielded, this year, upwards of 550 dozen. He obtains for his oranges this season, wholesale, sevenpence to eightpence the dozen, and I have been informed that twopence the dozen will pay the expenses of cultivation; all above that sum is profit to the grower.

There appears to me to be a great desire on the part of the orange-growers in this colony, to import the "St. Michael's orange,"—regarding it as a variety of very superior quality; many had supposed they had obtained it, having ordered plants from Europe, but were not satisfied with the result, as it did not produce the expected thin-skinned variety, free from seeds. The disappointment arises, in my opinion, from this cause,—from observations made at the Azores, I do not consider that, except as a variety, it differs from the common orange generally cultivated in the colony, excepting any improvement may take place in the quality of the fruit, resulting from genial climate, soil, or careful cultivation. There are some very old Orange-trees at the Azores, and these bore thin-skinned oranges, very juicy and free from pips, and no doubt the thinness of the skin and freedom from seeds will be found to depend on the age and careful cultivation of the tree. The younger trees in all the orangeries I examined at the Azores, and the fruit which was at the same time in process of packing for England, were for the most part similar in quality to the common Orange produced in New South Wales, and often with an abundance of seeds.

Mr. George Oakes—another extensive orange-grower—has been very successful in the cultivation of the Orange near Paramatta, and well bears out what the soil and climate is capable of producing. Three Navel Oranges, taken from trees that will be five years old next spring, and that were grafted on seedlings, weighed, respectively, 22 ounces, $22\frac{3}{4}$ ounces, and $25\frac{1}{2}$ ounces. Two common oranges, on a single stalk, weighed together 32 ounces. Some wax-models of these and other Australian fruit were made by order of the Commissioners for the Paris Exhibition of 1867, to show what oranges could be grown in New South Wales, not to be surpassed in their size only, but in their equally luscious flavour, which large-sized fruits do not always possess. Mr. Oakes had

also some large specimens of the Emperor Mandarin Orange, which also testify to the excellence of the cultivation. It may be mentioned for the information of those forming orangeries, that Mr. Oakes prepares his ground thoroughly. It is all well drained, and has been manured with bones and lime.

POST-PLIOCENE CLIMATE IN CANADA.

Principal Dawson has published in the 'Canadian Naturalist' for February, 1866, a list of some species of plants he has found in the well-known deposit of Leda clay, at Green's Creek, on the Ottoway, from which he has been able to arrive at a satisfactory estimate of the climate prevailing there at the time of their deposit. The plants occur in the lower part of the Leda clay, which Dr. Dawson considers to be newer than the true Boulder clay. The species are:—

Drosera rotundifolia, L. *Acer spicatum*, Lamx. *Potentilla canadensis*, L. *Gaylussaccia resinosa*, Tor. et Gr. *Populus balsamifera*, L. *Thuja occidentalis*, L. *Potamogeton perfoliatus*, L. *Potamogeton pusillus*, L. *Equisetum scirpoides*, Michx. And some undetermined species of *Cariceæ*, *Gramineæ*, and *Algæ*, and a species of *Fontinalis.*

None of the plants above mentioned is properly Arctic in its distribution, and the assemblage may be characterized as a selection from the present Canadian flora of some of the more hardy species having the most northern range. Green's Creek is in the central part of Canada, near to the parallel of 46°; and an accidental selection from its present flora, though it might contain the same species found in the nodules, would certainly include with these, or instead of some of them, more southern forms. More especially the Balsam Poplar, though that tree occurs plentifully on the Ottawa, would not be so predominant. But such an assemblage of drift plants might be furnished by any American stream flowing in the latitude of 50° to 55° north. If a stream flowing to the north it might deposit these plants in still more northern latitudes, as the M'Kenzie river does now. If flowing to the south, it might deposit them to the south of 50°. In the case of the Ottawa, the plants could not have been derived from a more southern locality, nor probably from one very far to the north. We may therefore safely assume that the refrigeration indicated by these plants

would place the region bordering the Ottawa in nearly the same position with that of the south coast of Labrador fronting on the Gulf of St. Lawrence, at present. The absence of all the more Arctic species occurring in Labrador, should perhaps induce us to infer a somewhat more mild climate than this.

The moderate amount of refrigeration thus required, would, in my opinion, accord very well with the probable conditions of climate deducible from the circumstances in which the fossil plants in question occur. At the time when they were deposited the sea flowed up the Ottawa valley to a height of 200 to 400 feet above its present level, and the valley of the St. Lawrence was a wide arm of the sea, open to the Arctic current. Under these conditions the immense quantities of drift ice from the northward, and the removal of the great heating surface now presented by the low lands of Canada and New England, must have given for the Ottawa coast of that period a summer temperature very similar to that experienced on the Labrador coast, and with this conclusion the marine remains of the Leda clay as well as the few land mollusks whose shells have been found in the beds containing the plants, and which are species still occurring in Canada, perfectly coincide.

The climate of that portion of Canada above water at the time when these plants were imbedded, may safely be assumed to have been colder in summer than at present, to an extent equal to about 5° of latitude, and this refrigeration may be assumed to correspond with the requirements of the actual geographical changes implied. In other words, if Canada was submerged until the Ottawa valley was converted into an estuary inhabited by species of *Leda*, and frequented by capelin, the diminution of the summer heat consequent on such depression would be precisely suitable to the plants occurring in these deposits, without assuming any other cause of change of climate.

BOTANICAL NEWS.

The Panama newspapers advertise for sale an estate near Portobello, which contains immense tracts covered with vegetable Ivory, there known by the name of "Tagua." Until now, botanists were ignorant of the existence of *Phytelephas* in the province of Panama, though the plant was known to occur in the more southern territory of Darien.

Mr. Howard reports, concerning a fifth remittance of Cinchona Bark from India, that, on the whole, it is unquestionably the most encouraging that he has had an opportunity of examining from that country.

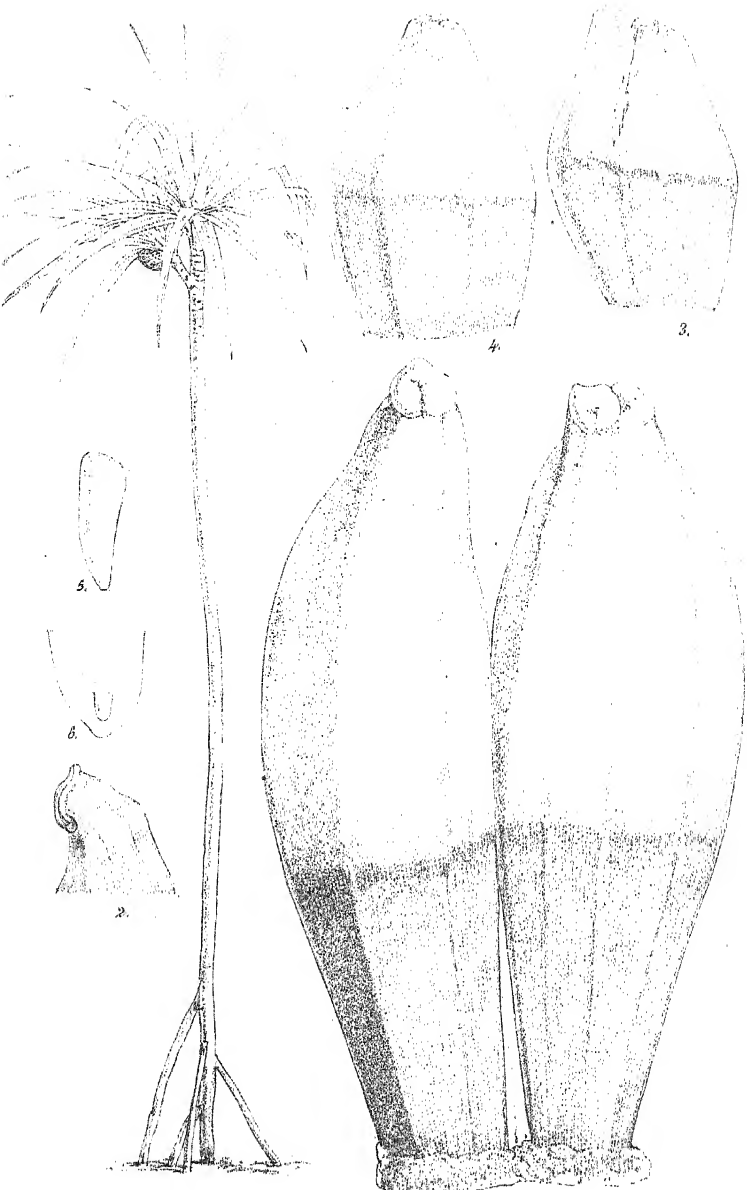
Dr. Masters is delivering a course of weekly lectures on "Plant Architecture," to the members of the Royal Horticultural Society.

M. Triana presented his memoir on the *Melastomaceæ* to the last meeting of the Linnean Society. It describes more than 2000 species, belonging to about 150 genera, and is of special value from the care with which the author has traced the synonymy, and identified, from the examination of authentic specimens, the species of former authors.

M. Denis, of Hyères, has produced a remarkable hybrid Palm, by impregnating the ovules of *Chamærops humilis* with the pollen of *Phœnix dactylifera*. The fruit is intermediate in form and structure between the two parents, and the young plant grown from the hybrid seed seems to be most like the male parent.

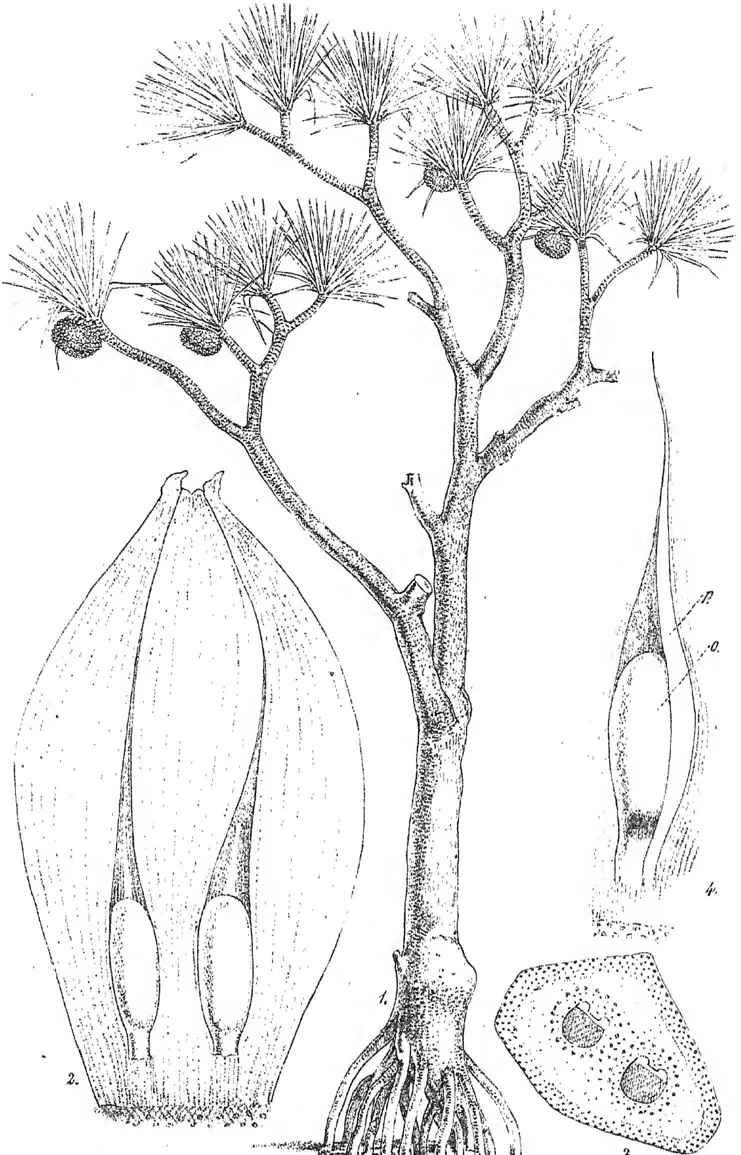
Botanical Society of Edinburgh.—*Thursday*, 14*th March*.—Isaac Anderson-Henry, Esq., of Woodend, President, in the chair. The following communications were read:—1. On the Hybridization or Crossing of Plants. By the President. The author had begun his experiments as far back as 1840, having then been convinced of the truth of the Lamarckian doctrine of development. He gives an account of his various efforts, sometimes carried on to produce effective florists' flowers, and at other times with more purely scientific objects in view. One of the more interesting conclusions which he deduces from his numerous experiments is the following:—I may here notice a fact I have found of almost universal occurrence among my experiments, that when I had to cross an American with an Asiatic species, it took much more kindly than crossing either of these, especially the former, with European species; and, lest I shall not have another opportunity of recurring to this subject, I may here observe also the decided preference of plants of the southern hemisphere to intercross among themselves, however remote their original homes may be—*e. g.* I found how much easier it was to cross Australian and New Zealand plants with their allies of South America, than with European or kindred species in the northern hemisphere. I have also observed that true American species have greater aversion to cross with European than with Asiatic species, and that Asiatic species have no less aversion to intermix with European kinds. There is only one instance, I remember, of effecting a successful cross between an Asiatic and a European species, and that was in crossing a small species of Rhododendron with yellow Helianthemum-like flowers, being a form of *Rhododendron lepidotum* called *R. elæagnoides*, of the Sikkim ranges, with *R. ferrugineum*, a European kind. Of this cross I raised two plants; one died, and I kept the other for years; it flowered with me, the blooms being dirty red, splashed with a pale yellow tint. It was an odd-looking thing, and I afterwards sent it to Kew as a botanical curiosity. What became of it there I never heard. 2. Notes on some of the *Compositæ* of the Andes, and more particularly on *Chuquiraga insignis*. By Professor Jameson, of Quito. Communicated by Isaac Anderson-Henry, Esq. 3. Obituary Notice of Professor John Goodsir. By Professor Balfour. Dr. Balfour alluded to the loss which the Society had sus-

tained by the death of the distinguished professor of anatomy. This melancholy event took place on 6th March, at South Cottage, Wardie, the same cottage in which Professor Edward Forbes died in 1854. Professor Goodsir was born at Anstruther in 1814. He studied first at St. Andrew's, and then at Edinburgh. He was an apprentice of Mr. Nasmyth, the eminent dentist, and studied anatomy under Dr. Knox, natural history under Professor Jameson, and veterinary surgery under Professor Dick. He occupied for some years the office of Conservator of the Museum of the Royal College of Surgeons, and he then became Demonstrator of Anatomy in the University, succeeding Dr. Monro as Professor of Anatomy in 1846. Since that time he has devoted himself assiduously and successfully to the duties of the chair. He embraced, in his researches, anatomy and physiology in all their branches, both animal and vegetable. He joined the Botanical Society in 1841, and acted as secretary from 1842 to 1848, when he was chosen vice-president. He was an active member of the Wernerian Society, and, along with his brother Harry (who perished in the Franklin expedition) and Edward Forbes, he read many valuable zoological papers to the Society. He became a Fellow of the Royal Society of Edinburgh in 1842, and of the Royal Society of London in 1846, after communicating, through Professor Owen, a paper on the *suprarenal thymus* and *thyroid* bodies. He was one of the first comparative anatomists of the day, and he took a deep interest in veterinary matters. Goodsir was a sound anatomist, and totally differed from the modern views of science relative to the origin of man. His special lectures on man are well worthy of being published, and it is hoped that sufficient notes are left to enable some one to prepare them for the press. By the death of Professor Goodsir, science has been deprived of an original thinker, a most zealous and successful worker and discoverer, and his pupils have lost a warm and devoted friend and teacher. With all his learning he was modest and unassuming, and he was always ready to aid others who were labouring in the cause of science. His lectures were not merely descriptive—they brought before the mind of the hearer philosophic views of anatomy of a highly suggestive nature. They will bear fruit in after years. His naturally robust frame suffered much from his continued and pressing anatomical labours. He was attacked with partial paralysis of the lower extremities, which, after many years, ended in his death—the disease depending on atrophy of the spinal cord. 4. Report on the State of Open-Air Vegetation in the Royal Botanic Garden. By Mr. M'Nab. Since the last meeting of the Botanical Society (14th February, 1867), the weather has been very variable, and of such a nature as greatly to retard the progress of open-air vegetation. The plants noted in bloom are *Crocus vernus* and *Orobus vernus*, on 15th February; *Scilla bifolia* and *Rhododendron atrovirens*, on the 16th; *Doronicum Caucasicum* and *Symplocarpus fœtidus*, on the the 18th; *Nuttallia cerasiformis*, on the 20th; *Omphalodes verna*, *Arabis albida*, on the 22nd; *Sisyrinchium grandiflorum album*, *Scilla Sibirica*, and *Aubretia grandiflora*, on the 23rd; *Iris reticulata*, on the 2nd of March; *Narcissus pumilus*, on the 4th; *Narcissus minimus*, on the 5th; *Scilla bifolia major*, on the 10th; and *Tussilago Farfara*, on the 13th. 5. Mr. John Sadler reported the discovery of *Buxbaumia indusiata*, in Ross-shire, by Mrs. Captain Clarke, of Meddist. This is the first time that this moss has been met with in Scotland.



Fitch lith.

Vincent Brooks, Imp.



Fitch, lith.

Vincent Brooks, Imp.

REVISION OF THE INDIAN SCREWPINES AND THEIR ALLIES.

By S. Kurz, Esq.

(Plates LXIV. and LXV.)

(*Concluded from page* 106.)

13. *P. verus*, Rumph. Herb. Amb. iv. 139. t. 74 (*mala*). Arboreus v. divaricato-decumbens, ramosus, 15–20-pedalis; folia marginibus costâque subtus spinis albidis rectis horride armata, strictiuscula, acuminatissima, albido-glauca v. glauca; spathæ marginibus carinâque spinulosæ; stamina racemose connata; syncarpia hominis caput magna v. majora, solitaria, dein aurantiaca; drupæ per 8 v. plures in phalanges apice tessellato-convexiusculas connatæ; stigmata oblique trigona, parvula.—*Kaida Taddi*, Rheede, Malab. ii. f. 6. *Keura odorifera*, Forst. Reg. Arab. 172. *Arthrodactylis spinosa*, Forst. Gen. n. 75. *Pand. odoratissimus*, Linn. fil. Suppl. 424; Roxb. Pl. Corom. i. 65. t. 94–96; ejusd. Fl. Ind. iii. 738; Kunth, Enum. Pl. iii. 94; Miq. Fl. Ind. Bat. iii. 156; Griff. Notul. Monocot. 159. t. 174. *P. spiralis*, Blanco, Fl. d. Fil. 777; R. Br. Prodr. 341?; Kunth, Enum. iii. 100? *P. Blancoi*, Kunth, Enum. iii. 583. *P. fascicularis*, Lamk. Encycl. i. 372; Willd. Sp. Pl. iv. 646; Kunth, Enum. Pl. iii. 98. *P. littoralis*, Jungh. Topogr. Naturw. Reise d. Java, 61; Miq. Fl. Ind. Bat. iii. 158. *P. leucanthus*, Hassk. Fl. (Bot. Ztg.) 1842; Beibl. ii. 14. *Hasskarlia leucacantha*, Walp. Ann. i. 753. *Pand. Millori*, Roxb. Fl. Ind. iii. 739; Hort. Beng. 71; ejusd. Icon. ined. xv. t. 4.

Var. *a. littoralis;* foliis albido-glaucis, strictis, horride spinosis, spinis usque 5 lin. longis.

Var. *β. flaccida;* foliis minus albido-glaucis, flacciusculis, spinis dimidio brevioribus armatis.

Hab. Common along the shores all over the Indian Archipelago!, Malacca!, Birma!, Bengal! and Malabar, extending into N.W. India, but here most likely only cultivated; Assam, indigenous in the plains and hills of Gowhatty, *Simons!;* Hort. Bot. Calcutt.; Wallich, Cat. 8589!; Ceylon, *Thw. C. P.*, 3739.

Distr. N.W. Australia?; Ins. Maris Pacif.; Hongkong.

Caudices prostrati, terræ incumbentes, radiantes, squamati, dein diva-

ricato-erecti, arborei, crus human. crassi, canescentes, cicatricati, apice furcato-diviso sæpius radicosi, basin versus radicibus aëreis creberrimis brach. interdum crassis tuberculatis sustenti. *Folia* substricta v. rarius in speciminibus adultioribus flaccidula, coriacea, fere albido-glauca v. glauca, spiraliter trifaria, lineari-lanceolata, 3–4½ (juvenilia 8–10) ped. longa, 3–3¼ poll. lata, acuminatissima, marginibus antrorse costâque subtus antrorse retrorseque horride spinosa; spinæ rectiusculæ nunc 3–4, nunc 1½–2 lin. tantum longæ et apicibus purpurascentes. *Spadix masc.* odoratissimus, pendulus, racemosus, spathatus; spathæ sursum sensim minores, cymbiformi-lanceolatæ, acute carinatæ, cuspidatæ, striatæ, marginibus carinâque spinulose ciliatæ. *Stamina* plurima (10–15) in stipitem communem racemose connata; antheræ filamentis paullo longiores, apice aristato- v. uncinato-mucronatæ, rima longitudinali dehiscentes. *Syncarpia* solitaria, infantis capitis magnitudine v. majora, globosa v. oblonga, pulcherrime crocea v. viridia, dein fuscescentia. Drupæ 8–20-næ connatæ, 2–3- pollicares, fibroso-lignosæ, carnescentes, nitentes, apice tessellato-concretæ, concaviusculæ; stigmata trigono-reniformia, minora.

NOM. VERN. Pandan Laut, *Mal.*; Kea, *Beng.*; Sataphu, *Birm.*; Ledelet, *And.*

Some varieties of this species resemble so much *P. lævis* that only the armed leaves distinguish them. *P. littoralis*, Jungh., is very marked by the fearful spines and whitish aspect, but otherwise does not differ. I have since seen many specimens which are quite intermediate, and I suspect even that it is only a younger state of growth.

As in the case of *P. furcatus*, we meet here with plants which constantly bear green fruits, becoming afterwards brown, and others which become bright orange-coloured. An objection made by Professor Miquel, Fl. Ind. Bat. iii. p. 157, with reference to the size of the fruits, is not well founded, as is more plainly shown by the Dutch text.

14. *P. lævis*, Rumph. Herb. Amb. iv. 148; Kunth, Enum. Pl. iii. 100; Hassk. Cat. Bog. 60; ejusd. Pl. Jav. Rar. 163. Arboreus, 20–25-pedalis v. prostatus; folia inermia, subflaccida, albido-glauca, acuminatissima; spathæ læves, odoratæ; stamina racemose connata; syncarpia ignota.—*P. moschatus*, Rumph. Herb. Amb. iv. 147; Voigt. Cat. Hort. Calc. 682; Miq. Fl. Ind. Bat. iii. 165. *P. inermis*, Roxb. Fl. Ind. iii. 744; Kunth, Enum. Pl. iii. 100; Reinw. in Bl.

Cat. Buitenz. 111. *P. odoratissimus*, Noronh. Verh. Bat. Genootsch. v. 63.

HAB. Moluccos; western Java, on the other Malayan islands mostly cultivated as on the Indian continent; Naga hills in Assam according to Masters (?).

Arboreus v. rarius subfruticosus, caudicibus divaricato-adscendentibus, brach. usque crus human. fere crassis aculeato-tuberculatis cinerascentibus, apice furcato-ramosis, basi usque ad mediam radicibus aëreis creberrimis densissime aggregatis sustentis. *Folia* coriacea, spiraliter trifaria, $2\frac{1}{2}$–$3\frac{1}{2}$ ped. longa, 2–$2\frac{1}{2}$ poll. lata, linearia, acuminatissima, subflaccida, lateribus rectangulariter deviis v. apicem versus planiuscula, inermia, albido-glauca. *Spadix masc.*, *stamina spathæ*que exacte uti in *P. odoratissimo*, sed hæc marginibus carinâque subtus brevissimæ.

NOM. VERN. Pudak, *Mal.*

There occurs also a smaller prostrate form with very narrow leaves, but otherwise not different, which is mostly produced by cutting down the main stems.

15. *P. Candelabrum?*, P. d. B., Fl. d'Oware, i. 37. t. 21, 22; Kunth, Enum. Pl. iii. 97 (syncarpia nimis parva describuntur, anne adhuc immatura?). Arboreus v. divaricato-erectus; folia marginibus costâque subtus spinosa (saturate viridia sec. *Rheede*); spathæ marginibus carinâque spinulosæ; syncarpia oblonga, hom. caput crassa, solitaria, dein flavicantia; drupæ binæ v. ternæ connatæ, apice convexiusculæ; stigmata peltata, postice acute producta, rima profunda inter se discreta.—*Kaoda*, Rheede, Malab. ii. t. 1–5 (icon. optima!).

HAB. Malabar, *Rheede*; Siam, *Teijsmann*.

DISTR. Western Africa?

Stirpem non vidi. *Syncarpia* pedem longa, $\frac{3}{4}$ ped. crassa, solitaria, oblonga, obscure trigona, obtusa; drupæ 2–3-næ, in phalanges 5–6-gonas elongato-obconicas connatæ; stigmata crassa, parva, peltata, oblique subsessilia, obtusa v. sæpius uno latere acute producta.

The proper place for this species may be perhaps near *P. Leram.*

16. *P. dubius*, Spreng. Syst. iii. 897; Kunth, Enum. Pl. iii. 95; Miq. Fl. Ind. Bat. iii. 159. Arbor excelsa, 40–50-pedalis, subsimplex; folia largissima, crassissima, cuspidata, marginibus costâque subtus spinulosa, atro-viridia; flores masc. ignoti; syncarpia solitaria, oblonga, maxima; drupæ 2–3-næ, rarius per plures in phalanges ultra

medio liberas pyramidatas connatæ; stigmata peltata, magna.—*P. latissimus*, Blume in Rumph. i. t. 53 (*mala*); *P. fascicularis β*, Lamk. Encycl. i. 372. *Folium Bagea maritimum*, Rumph. Herb. Amb. iv. 151. t. 80 (t. 81 quid?). *Pand. Bidur*, Jungh. ms.

HAB. Moluccos!; southern coast of Java, *Junghuhn*; Banca and Riouw Archipelago?

Caudex arboreus, erectus, crassitudine Cocoes nuciferæ, 40–50, immo 60-pedalis, simplex v. sæpius apice divisus, sparse acute verrucosus, cinereus, basi radicibus aëreis brach. crassis seriatim verrucosis sustentus. *Folia* spiraliter trifaria, crassissime (sæpius 1 lin.) coriacea, flaccida, 12–15 ped. longa, usque ½ ped. lata, lato-linearia, cuspidata, atro-viridia, subtus glaucescentia, lateribus rectangulariter deviis, marginibus costâque subtus crasse incurvato-spinosa, spinis planiusculis vix pungentibus. Syncarpia solitaria, pendula, fere 2–2½ ped. longa, 1½–1¾ ped. crassa, oblonga v. subglobosa, glauco-viridia; drupæ 3 poll. longæ, 2–4-næ, in phalanges compresso-5–6-gonas connatæ v. rarius una alteraque libera, lignosæ, apice pyramidato-productæ, supra usque ad mediam liberam glauco-virides v. albido-glaucæ, infra castaneæ; stigmata oblique sessilia, peltata, magna, testacea.

NOM. VERN. Bidur, *Mal.*

This is one of the finest and largest Screwpines I ever saw in the Malayan Archipelago, with fruits which generally resemble somewhat those of *Durio zibethinus*.

TAB. LXIV.—The whole plant. Fig. 1. Two drupes, natural size. Fig. 2. Upper part of a drupe, with side-view of the stigma.

SPECIES INDICÆ RELIQUÆ, MAGIS MINUSVE DUBIÆ.

1. *P. unipapillatus*, Dennst. Clav. Hort. Malab.—*Perin Kaida Taddi*, Rheede, Hort. Malab. ii. t. 7.

HAB. Malabar.

2. *P. repens*, Rumph. Herb. Amb. iv. 152; Miq. Fl. Ind. Bat. iii. 165.—*P. Samak*, Hassk. Cat. Bogor. 61; Fl. (Bot. Ztg.) 1842, Beibl. ii. 14; Miq. Fl. Ind. Bat. iii. 165; Walp. Ann. i. 753. *P. variegatus*, Miq. Fl. Ind. Bat. iii. 165 (forma foliis variegatis ex insula Madura nec Nov. Holl.).

HAB. Indian Archipelago from the Moluccos to Java, and Banca.

NOM. VERN. Samak, *Mal.*

I can give no description sufficient to distinguish this form from *P. verus.* The spines are commonly curved, and the colour of the leaves is more yellowish, but also often as in *P. verus.* The stems are very thick, and commonly prostrate. The fruits and flowers are unknown to me, but Mr. Teijsmann assures me that he has seen them, and found them quite different.

3. *P. spurius*, Rumph. Herb. Amb. iv. 142. t. 75. Folia 2–3 ped. longa, 2 poll. lata, dorso a medio tantum spinosa, spinis non spinescentibus sed rotundatis et glabris; spadix masc. (uti in *P. furcato*) crus human. crassus; syncarpia *Durionis* magnitudine, rotunda v. elliptica, griseo-viridia v. fuscescentia; drupæ pyramidatæ, 4–6-gonæ, apice breviter pungente-acuminatæ (sec. *Rumph.*).

HAB. Moluccos.

I previously thought it might be possible to unite *P. spurius*, Rumph., with *P. odoratissimus*, Linn., but the colour of the drupes, which are said to be spinous-pointed, does not agree quite well. Generally there seems to be some mistake with reference to the plates. The fruit of *Folium Bagea maritimum* of t. 81 has evidently nothing to do with the plate 80, where a single drupe of that kind is figured, agreeing so exactly with my *P. dubius* that there remains no doubt about the correctness of the identification. Moreover, his description agrees. The figure, however, on t. 81 represents *P. odoratissimus*, though the stigmata are somewhat too strongly expressed. With reference to t. 75 (*P. spurius*), I remark that the drupes are all simple, figured with indication of a 5–6-angled form. In the description, p. 142, however, is said, "Maturus vero in multa aperitur ac dehiscit segmenta, quorum quodvis ex variis constat pyramidibus, quæ non separantur, nisi vi," etc. This evidently agrees better with plate 81. I suspect, therefore, that plate 81 may belong to his plate 74 (*P. verus*), the only obstacle being the ramification. These, however, are only suspicions, the truth of which can be made out only on the classical spot with the aid of the native names.

4. *P. montanus*, Miq. Fl. Ind. Bat. iii. 161 (*cf. P. helicopus*, Kurz).

HAB. Moluccos.

5. *P. sylvestris*, Rumph. iv. 145. t. 77; Miq. Fl. Ind. Bat. iii. 161 (verisimiliter eadem sp. ac *P. fœtidus*, Roxb.).

HAB. Moluccos.

6. *P. Bagea*, Miq. Fl. Ind. Bat. iii. 159.—*Folium Bagea verum*, Rumph. Herb. Amb. iv. 150.

HAB. Moluccos.

Perhaps only a small form of *P. dubius*.

7. *P. lævis*, Lour. Fl. Cochinch. 741; Willd. Sp. Pl. vi. 646.

HAB. Cochinchina.

8. *P. odoratissimus*, Lour. Fl. Cochinch. 741.

HAB. Cochinchina.

By the simple drupes and the bifid stigmata very distinct from the Linnean species. Likely identical with *P. Candelabrum?*

9. *P. gracilis*, Blanco, Fl. d. Filip. 778; Kunth, Enum. Pl. iii. 584 (*cf. P. humilem*, Roxb.).

HAB. Philippines.

10. *P. exaltatus*, Blanco, Fl. d. Filip. 778; Kunth, Enum. Pl. iii. 584; Miq. Fl. Ind. Bat. iii. 163.

HAB. Philippines.

11. *P. radicans*, Blanco, Fl. d. Filip. 780; Kunth, Enum. Pl. iii. 584; Miq. Fl. Ind. Bat. iii. 166.

HAB. Philippines.

12. *P. spiralis*, Miq. in De Vriese, Tuinbouw Flora.

HAB. Said to be New Holland.

13. *P. pedunculatus*, R. Br. Prod. 341; Kunth, Enum. Pl. iii. 100.

HAB. Tropical New Holland.

SPECIES RELIQUÆ MASCARHENÆ.

(*Ad sect.* Microstigma *v.* Acrostigma.)

1. *P. erigens*, P. Thouars, Journ. d. Bot. i. 46; Kunth, Enum. Pl. iii. 97.

HAB. Bourbon.

2. *P. conoideus*, P. Thouars, Journ. d. Bot. i. 47; Kunth, Enum. Pl. iii. 97.

HAB. Ile de France.

Judging from the description, this species seems not to differ at all from the former.

3. *P. sphæroideus*, P. Thouars, Journ. d. Bot. i. 46; Kunth, Enum. Pl. iii. 97.

HAB. Ile de France.

4. *P. globuliferus*, P. Thouars, Journ. d. Bot. i. 47; Kunth, Enum. Pl. iii. 97.

HAB. Ile de France.

By the diagnosis given not to be distinguished from the former.

5. *P. pygmæus*, P. Thouars, Journ. d. Bot. i. 46; Kunth, Enum. Pl. iii. 99 (*cf. P. affinem*, Kurz).

HAB. Madagascar.

6. *P. edulis*, P. Thouars, Journ. d. Bot. i. 47; Kunth, Enum. Pl. iii. 99 (*cf. P. humilem*, Rumph.).

HAB. Madagascar.

(*Ad sect.* Ryckiam.)

7. *P. muricatus*, Thouars, Journ. d. Bot. i. 48; Kunth, Enum. Pl. iii. 97.

HAB. Madagascar.

(*Ad sect.* Arthrodactylum.)

8. *P. utilis*, Bory, It. ii. 3; Kunth, Enum. Pl. iii. 96; Dietr. Lex. Nachtræg. v. 503; Spreng. Syst. Veg. iii. 897; Miq. Fl. Ind. Bat. iii. 159. Arboreus, usque 60-pedalis; folia e basi lata lanceolata, crassissima, stricta, subplana, marginibus costâque subtus rubro-spinulosa; syncarpia solitaria, plerumque depresso-globosa, capitis magnitudine, glauco-viridia; drupæ 4–8-næ, in phalanges pyramidatas usque ad mediam partem liberas connatæ, lignosæ; stigmata reniformia, dein acute producta.—*P. odoratissimus*, Jacq. Fragm. p. 21. t. 13, 14. f. 1 (fide Willd.); Mirb. in Ann. Mus. Par. xvi. 439. t. 17 (semen).—*P. sativus*, P. Thouars, Journ. d. Bot. i. 44 (fide syn.). *Marquartia globosa*, Hassk. Fl. (Bot. Ztg.) 1842; Beibl. ii. 14; ejusd. Cat. Bogor. 61. *Hasskarlia globosa*, Walp. Ann. i. 753. *Pandanus spurius*, Miq. Fl. Ind. Bat. iii. 157 (non Rumph.). *P. nudus*, P. Thouars, Journ. d. Bot. i. 45; Kunth, Enum. Pl. iii. 96. *P. Candelabrum*, Hook. Bot. Mag. t. 5014 (non P. d. B.).

HAB. Madagascar and Bourbon. At present cultivated everywhere in the tropics and also introduced into the Antilles.

Var. *β. lucidus;* omnibus partibus minor, foliis deflexis angustioribus brevioribus, marginibus rectangulariter deviis, supra lucidis; syncarpiis pugni magnitudine v. minoribus, longe pedunculatis.—*Pandanus lucidus*, Wall. in Voigt, Cat. Hort. Calc. 683; an huc *P. Mauritanus* et *elegantissimus*, Hort. Kew.?

HAB. Probably Bourbon; in the Botanic Gardens, Calcutta, cultivated. It is quoted in Masters's 'Report,' n. 981, with a query, as growing at Seebsaghur, in Assam, which is certainly wrong.

Caudex humilis, 5–10-pedalis, brachio humano crassior, dein elatus, 15–30- (in solo nativo sec. cl. Bory. 50–60-)pedalis, crus crassus, simplex, furcato-ramosus, fusco-viridis et eleganter cicatrizatus, dein canescens, basi radicibus aëreis sæpe abbreviatis 1–2 poll. crassis subseriatim tuberculosis sustentus. *Folia* crasse coriacea, confertissima, spiraliter trifaria, 3–3½ rarius usque 4½ ped. longa, e basi sensim dilatatâ 2–2½ poll. latâ lanceolata, pungente acuminata, stricta, subplana, margine purpurascente costâque subtus distanter rubro-spinulosa; spinulæ lineam longæ, rectiusculæ, in sicco fuscescentes. *Flores masc.* ignoti. *Syncarpia* solitaria, rarius basi 1–2 minoribus aucta, depresso-globosa v. rarius oblonga, dein cernua, nunc brevi nunc elongato-pedunculata, glauco-viridia, fuscescentia; drupæ lignosæ, 4–8næ, in phalanges connatæ; phalanges pyramidatæ, a medio fere liberæ, 1½ poll. longæ, 1–1¼ poll. medio latæ, compressæ, apice oblique truncatulæ et sæpius digitatim divisæ; stigmata sessilia, parva, peltata v. reniformia, dein lobis acute productis, emarcescentia. Ovula solitaria, rarissime bina, anatropa, placentæ arcte appressa.

In the Botanic Garden at Buitenzorg, two plants of a *Pandanus* are cultivated, which differ from *P. utilis* by the much larger leaves, placed in a *perfect spiral.* They came under the name of *P. utilis*, from the Botanic Garden at Amsterdam. In general, there seems to exist some diversity of opinion about the true *P. utilis*, which I found to be a very variable plant. *P. lucidus*, Wall., has every appearance of being a very distinct species, by the much smaller leaves, etc., and also by the fruits. On this account I consider this species only a marked variety, as there are transitions enough to justify my doing so.

TAB. LXV.—Fig. 1. A full-grown tree in the Botanical Gardens, Java. Fig. 2. Vertical section of a young drupe. Fig. 3. Transverse section of the same. Fig. 4. Ovulum: *o*, ovulum; *p*, placenta.
TAB. LXIV.—Fig. 3 and 4. Ripe fruits.

9. *P. drupaceus*, P. Thouars, Journ. d. Bot. i. 45; Kunth, Enum. Pl. iii. 96 (*cf. P. verum*, Rumph.).

HAB. Ile de France.

10. *P. maritimus*, P. Thouars, in Journ. d. Bot. i. 45; Kunth, Enum. Pl. iii. 96 (an cum *P. unipapillato*, Dennst., comparandus?).

HAB. Ile de France.

11. *P. elegans*, P. Thouars, Journ. d. Bot. i. 46; Kunth, Enum. Pl. iii. 96.

HAB. Bourbon.

12. *P. palustris*, P. Thouars, Journ. d. Bot. i. 48; Kunth, Enum. Pl. iii. 96.

HAB. Ile de France.

13. *P. purpurascens*, P. Thouars, Journ. d. Bot. i. 44; Kunth, Enum. Pl. iii. 97 (*cf. P. Candelabrum*, P. d. B.).

HAB. Ile de France.

14. *P. ensifolius*, P. Thouars, Journ. d. Bot. i. 46; Kunth, Enum. Pl. iii. 97.

HAB. Madagascar.

15. *P. reflexus*, Lodd. in Desf. H. P.—*Doornia reflexa*, De Vriese, Kew Garden Misc. v. 257; ejusd. in Linnæa, xvi. 762; ejusd. in Tuinbouw Flora, i. 174; Walp. Ann. v. 858.

HAB. Bourbon.

16. *P. obeliscus*, P. Thouars, Journ. d. Bot. i. 49; Kunth, Enum. Pl. iii. 100 (cujus sectionis ?).

HAB. Madagascar.

Species reliquas indescriptas numerosissimas, in operibus Gaud. Voy. de la Bonite et Hombr. et Jacquin, Voy. au Pôle Sud, iconibus tantum illustratas, nec non illas a cl. Steudelio in nomenclatore nominibus nudis commemoratas silentio prætermitto.

CYCLANTHEÆ.

1. FREYCINETIA, *Gaud.*

The distribution of the species of *Freycinetia*, a genus not less variable than the Screwpines, is about the same as that of *Pandanus.* It is however highly interesting to see that not a single species as yet has been found further to the west than Ceylon. Their centres therefore appear to be in the Indian Archipelago and in New Zealand; those of the Fiji islands may prove perhaps to be identical with the Malayan ones.

From Penang and Ceylon, and now lately from the Andamans, a few species have been noticed, but none from the Continent. This is to be ascribed partially to the imperfect knowledge which we possess

of all the countries of the continent, which bear more or less a Malayan character, such as Malacca, Cochinchina, etc. All species (except *F. leucacantha*, Miq.) are climbers, and mount often into the loftiest trees of the Malayan islands, to 150–200 feet high.

The whole genus requires re-examination in nature, which can be carried out nowhere, at present, except in the Botanical Garden at Buitenzorg, where the richest collection of them exists.

1. *F. angustifolia*, Bl. Rumph. i. 159. t. 43 ; Kunth, Enum. Pl. iii. 587 ; Miq. Fl. Ind. Bat. iii. 171.—*Carex arborea*, Rumph. Herb. Amb. vi. 21. t. 8. f. 2. *Freycinetia graminea*, Bl. Rumph. i. 159, in adn.; Miq. Fl. Ind. Bat. iii. 171 ; Kunth, Enum. Pl. iii. 587. (?) *F. Luzonensis*, Presl, Epim. Bot. 298 ; Walp. Ann. iii. 494 ; Miq. Fl. Ind. Bat. iii. 172. *F. Brunoniana*, Wall. Cat. 3660.

HAB. Ceylon, *Thwaites, C. P.* 366 ! ; Pooloo Penang, *Wall. Cat.* 3660 ! ; Indian Archipelago, Java ! ; Banca ! ; Western Sumatra, *Teijsmann, H. B.* 2011 ! ; Borneo, near Banjermassing, *Motley, n.* 1128 ! ; Moluccos.

2. *F. Gaudichaudii*, Br. et Bennett, Fl. Jav. Rar. i. 31. t. 9 ; Kunth, Enum. Pl. iii. 102 ; Miq. Fl. Ind. Bat. iii. 170.

HAB. Java !, in the hilly regions of the western parts.

3. *F. imbricata*, Bl. Rumph. i. 157. t. 40 ; Kunth, Enum. Pl. iii. 585 ; Miq. Fl. Ind. Bat. iii. 166.

HAB. Java, hilly regions of the western parts, common !

4. *F. scandens*, Gaud. in Freyc. It. Bot. 432. t. 42 ; Dcne. Descr. Herb. Timor. 40 ; Hook. et Arn. Bot. of Capt. Beech. Voy. iii. 97 ; Kunth, Enum. Pl. iii. 103 ; Bl. in Rumph. i. 158 (in adn.) ; Miq. Fl. Jungh. i. 166 ; ejusd. Fl. Ind. Bat. iii. 169.—*F. Javanica*, Bl. in Rumph. i. 157. t. 41 ; Kunth, Enum. Pl. iii. 586 ; Miq. Fl. Ind. Bat. iii. 169. *F. Bennettii*, Miq. Fl. Jungh. i. 167 ; ejusd. Fl. Ind. Bat. iii. 169 ; Walp. Ann. v. 859.

HAB. Indian Archipelago, Java ! ; Sumatra ; Moluccos ; Timour ; New Guinea.

DISTR. Sandwich Islands.

5. *F. insignis*, Bl. Rumph. i. 158. t. 42 ; Kunth, Enum. Pl. iii. 586 ; Miq. Pl. Jungh. i. 166 ; ejusd. Fl. Ind. Bat. iii. 170.—*F. marginata*, Bl. Rumph. i. 159 (in adn.) ; Kunth, Enum. Pl. iii. 587 ; Miq. Fl. Ind. Bat. iii. 171.

HAB. Indian Archipelago, Java ! ; Banca ! ; New Guinea ?

6. *F. radicans*, Gaud. in Freyc. It. Bot. 432. t. 43; Kunth, Enum. Pl. iii. 104; Miq. Fl. Ind. Bat. iii. 171.

HAB. Ceylon, *Thwaites*, *C. P.* 2333; Moluccos.

I have not yet seen this species, which Dr. Thwaites compares with the former.

7. *F. strobilacea*, Bl. Rumph. i. 156. t. 39; Kunth, Enum. Pl. iii. 585; Miq. Fl. Ind. Bat. iii. 168.—*Pandanus funicularis*, Herb. Amb. iv. 153. t. 82.

HAB. Moluccos.

Species reliquæ extra-Indicæ.

1. *F. leucacantha*, Miq. Fl. Ind. Bat. iii. 172; Walp. Ann. v. 858. —*Pandanus graminifolius* et *P. pygmæus*, Hort.

HAB. Unknown.

The habit of this species deviates much from all other Freycinetias, this being no climber, but remaining low and stunted.

2. *F. Banksii*, A. Cunn. in Hook. Comp. Bot. Mag. ii. p. 327; Hook. Fl. Nov. Zel. i. 237. t. 54 et 55.—*F. inclinans*, Br. et Benn. Pl. Jav. Rar. i. 32; Kunth, Enum. Pl. iii. 103. *Pandanus inclinans*, Sol. in Banks. Herb.

HAB. New Zealand.

3. *F. Baueriana*, Endl. Fl. Norf. 25; ejusd. Ill. Pl. Norf. t. 190. 193–199; Kunth, Enum. Pl. iii. 103.

HAB. Norfolk Island.

6. *F. demissa*, Br. et Benn. Fl. Jav. Rar. i. 32; Kunth, Enum. Pl. iii. 104.—*Pandanus demissus*, Sol. in Herb. Banks.

HAB. Otaheite islands.

5. *F. Urvilleana*, Hombr. et Jacq. Voy. au Pôle; Dcne. Bot. ii. 83. t. 2.

HAB. ?

Species nondum descriptæ.

6. *F. Vitiensis*, Seem. Miss. to Fiji.

HAB. Fiji islands, *Seem. n.* 647.

7. *F. Milnei*, Seem. Miss. to Fiji.

HAB. Fiji islands, *Seemann, n.* 648.

8. *F. Storckii*, Seem. Miss. to Fiji.

HAB. Fiji islands, *Seem. n.* 695.

9. *Freycinetia*, sp., Seem. Miss. to Fiji.

HAB. Fiji islands, *Seem. n.* 696.

10. *F. Webbiana*, Gaud. Voy. d. l. Bonite, t. 27.
11. *F. Arnottii*, Gaud. l. c. t. 35–36.
12. *F. Debrogasiana*, Gaud, l. c. t. 37.
13. *F. Cummingiana*, Gaud. l. c. t. 38 et 60.

Species excludenda.

F. arborea, Gaud. in Freyc. It. Bot. 431. t. 41; Kunth, Enum. Pl. iii. 104.

This species, from the Sandwich islands, does not exist in nature, as Dr Hillebrandt has kindly informed me. Gaudichaud, by mistake, described some *Cordyline* on which a *Freycinetia* was climbing.

A species of *Freycinetia* is recorded in Peter's 'Reise nach Mossambique,' p. 510, but according to the notes given it appears to me to be rather a true *Pandanus*.

EXPLANATION OF PLATES LXIV. AND LXV.

PLATE LXIV.—Full-grown tree of *Pandanus dubius*, Spreng. Fig. 1. Two drupes, natural size. Fig. 2. Upper part of a drupe, with side-view of stigma. Fig. 3 and 4. Ripe fruits of *Pandanus utilis*, Bory. Fig. 5. A seed of *Pandanus Leram*, Jones. Fig. 6. Embryo.

PLATE LXV.—Fig. 1. Full-grown tree of *Pandanus utilis*, Bory, in the Botanical Gardens, Java. Fig. 2. Vertical section of a young drupe. Fig. 3. Transverse section of ditto. Fig. 4. Ovulum: *o*, ovulum; *p*, placenta.

ERICA CARNEA, *Linn.*, GATHERED IN DEVON; WITH A FEW REMARKS ON THAT SPECIES AND *E. MEDITERRANEA*, *Linn.*

BY H. F. HANCE, PH.D., ETC.

In the month of June, 1852, I gathered on a heath near Newton Abbot, South Devon, an *Erica*, which I determined at the time, merely from the characters given in the 'British Flora,' as *E. mediterranea*, L., under which name it has since lain in my herbarium. At that period I was mainly occupied with matters unconnected with Botany, and paid little attention, consequently, to the interest attaching to the supposed discovery. Coming across the plant some months back, however, I was anxious to settle conclusively its claim to the name I had assigned it; and my herbarium, though containing a number of the Continental

Heaths, being deficient in several of those comprised in our flora, I made known my wants to Mr. T. R. Archer Briggs, who was so very kind as to supply from his own collections, and obtain from Mr. J. G. Baker, specimens of all those I did not possess, including the Hibernian *E. mediterranea*.

This latter is one of our critical plants. Considered by Mr. Bentham as identical with the Continental species of that name, it was distinguished by him, in his monograph of the genus written for De Candolle's Prodromus, as a var. *occidentalis* of *E. carnea*, L., passing by numerous intermediate forms into the type; but in his 'Handbook of the British Flora,' he no longer separates it as a variety. Bertoloni (Fl. Ital. iv. p. 331), after examination, considers it as quite distinct from *E. carnea*, and equally so, it would seem, though he does not say so *totidem verbis*, from the Continental *E. mediterranea*. In the eighth edition of Hooker and Arnott's 'British Flora,' it is distinguished as a var. *Hibernica* of the latter, whilst Professor Babington calls it *E. mediterranea*, with a query as to its being Linnæus's species. Professor Visiani (Fl. Dalm. ii. p. 143) admits both *E. carnea* and *E. mediterranea* (quoting under the latter Bentham's *E. carnea β. occidentalis*), and discriminates them by characters which, partly at least,—as for instance the acute or obtuse sepals, and the simple or bifid stigma,—seem imaginary. Mr. H. C. Watson, whose opinions, being never hastily pronounced, are of great weight, writes (Cybele Brit. ii. 149), "Strangely enough, Mr. Bentham unites the Irish species with *E. carnea*, probably through looking only at herbarium specimens, which are much alike; although, in a living state, the whole habit of growth of the two species, as well as their climatal requirements, are widely dissimilar." Bertoloni, Visiani, and Grenier, all distinguish *E. mediterranea* by its erect habit, as contrasted with the spreading, diffuse mode of growth of *E. carnea;* and Nyman (Sylloge Fl. Eur. 314) gives the distribution of the two plants as follows:—

E. carnea.—Switzerland, Austria, Germany (Alps, Ratisbon, Silesia), Italy (Piedmont, Lombardy, Tuscany, Rome), Dalmatia, Croatia, Hungary, Transylvania, Greece.

E. mediterranea.—Ireland, France (Gironde), Spain (Arragon, Galicia), Portugal;—omitting Dalmatia, probably through oversight.

Whilst *E. carnea* is a mountain plant, preferring subalpine localities,

Myall = *Acacia homalophylla*, A. Cunn.
Mallee = *Eucalyptus gracilis*, F. Muell.
Tarnock (drinking-vessel); and also a model of Coorong (canoe) = Bark of *Eucalyptus viminalis*, Labill.
Merrin-Merrin = Stone tomahawk.
Larkoe (the stone). The handle of the tomahawk is of *Acacia mollissima*, Willd.
Earip (Spurious Ironbark-tree) = *Eucalyptus leucoxylon*, F. Muell.
Baggup = *Xanthorrhœa australis*, R. Br. The peduncle is used for the lower portion of spears.

Baskets of great beauty are made of *Xeroles longifolia*, R. Br.

ADDITIONAL NOTES ON THE NATIVE TULIP-TREE OF NEW SOUTH WALES (*TELOPEA SPECIOSISSIMA*).

By George Bennett, M.D., F.L.S., etc.

Since my last communication on the "Waratah" or "native Tulip-tree" of New South Wales (published in the 'Journal of Botany' for December, 1865), I have had frequent opportunities of examining a number of Waratah plants, when flowering, both in a wild and cultivated state, during the spring months (September and October) in Australia, and, from the result of my more extended observations, I must, to a certain extent, correct my former statement that plucking the flowers *always* destroys the blossoms of the following year, for I have since ascertained, by careful examination, that it *generally* occurs as I had previously stated, but not *invariably*. In the blossoms permitted to remain—more particularly in young trees—the flowers of the ensuing year are developed with greater certainty and in greater profusion. On examining a number of trees when in flower, I found the blossoms produced from those on which the flowers of the preceding year had been allowed to remain, were more numerous and the shoots bore blossoms with greater certainty than in those from which the flowers had been gathered.

There are many cases recorded in which the floral axis, in place of bearing flowers, produces leaves; many instances of this kind have occurred this season among the Waratah plants growing in the Botanic

Gardens at Sydney, the flower becoming abortive, by several of the flowering buds, instead of developing themselves into blossoms, having thrown out a shoot from their axis, leaving the coloured bracts persistent until the branches were fully developed.

The Waratah is hardy and bears transplanting very well; the Proteaceous trees and plants do not grow well by cuttings from the stem, but are more readily propagated from layers, seeds, and suckers. The Waratah may readily be propagated by the roots being dug up in the month of December, cut into pieces, each retaining a small portion of the old stock, and then packed with earth in closed boxes. In this way they may be safely transmitted to any part of the world; many sent to England, packed in this manner, arrived in excellent condition, and produced some fine plants.

There is a white species of Coccus which is very destructive this season to the leaves and flowers of the Waratah, and has seriously injured many of the trees. This destructive insect has not been observed so numerous for some years.

ON THE SELAGINELLAS CULTIVATED IN THE ROYAL BOTANIC GARDEN, EDINBURGH.

BY W. R. M'NAB, M.D. EDINBURGH.

(From the Transactions of the Botanical Society of Edinburgh.)

The nomenclature of the cultivated Selaginellas is at present in a state of great confusion. The names given by Spring* in his monograph have not been adhered to, and, in many cases, the plants, when introduced, have been named without any attempt being made to discover whether the species had been already described or not. Such being the case, considerable confusion must be expected. In 1860 Professor Alex. Braun† published a paper entitled "Revisio Selaginellarum Hortensium," in which he gives the synonymy of the Selaginellas then cultivated on the Continent and in Britain. This paper has, however, been entirely overlooked in this country, and the names of the Selaginellas in our nurseries and gardens have remained as they

* Spring, Mém. de l'Acad. Roy. de Belgique, 1850.
† Annales des Sciences Nat. (Bot.) vol. xiii. 1860, p. 54.

were. There are also a few recently introduced species added to our lists since Professor Braun's "Revisio" was published, and the confusion is thus growing worse and worse every year.

To give an idea of the confusion of names, and the mistakes it leads to, the following may be stated:—In nurserymen's catalogues we see the same species under two names at different prices, and even marked at one place as a stove, and another as a greenhouse plant. Then, again, the varieties of that ever-varying *S. Martensii* do duty for a large number of species figuring in nursery catalogues under different names and at different prices. Then, lastly, we find the same species doing duty under two names at exhibitions in collections of limited extent sent in to compete for prizes.*

In attempting to name the Selaginellas in the Botanic Garden, I have had to examine a great many specimens from other collections. I am indebted to Mr. J. Smith, Curator of the Royal Gardens, Kew, for a set of the specimens cultivated in that establishment. The Hookerian Herbarium at Kew has also been consulted, and a set of dried garden Selaginellas from Professor Braun in the Kew Herbarium, has afforded the means of identifying the species mentioned in his "Revisio Selaginellarum Hortensium." Lastly, Messrs. Veitch and Sons, Chelsea, and Messrs. T. Jackson and Son, Kingston, have supplied me most liberally with any specimens I wanted from their establishments.

The arrangement followed is that of Professor Braun. All the species mentioned by him are inserted, although some of them are not, as far as I know, in cultivation in this country.

I. Homotropæ, A. Br. (*Homophyllæ*, Spr.)

Leaves all of the same shape (homomorphous) spreading in all directions.

A. Polystichæ.—Leaves in many rows.

(*a*) *Cylindrostachyæ.*—Bracts in many rows.

1. *Selaginella spinulosa*, A. Br. (*Lycopodium selaginoides*, Linn.) It is a native of Europe and North America. Found wild in Britain, and often cultivated.

* Such reprehensible practices are unfortunately not confined to Selaginellas, but pervade the garden nomenclature of every set of cultivated plants. Prominent attention was called to the evil at the International Congress which met in London last year, but no practical remedy has yet been adopted to cure it.—Ed.

(*b*) *Tetragonostachyæ.*—Bracts in four rows.

2. *Selaginella rupestris*, Spring. (*Lycopodium rupestre*, Willd.) Widely distributed over the globe, being found in North and South America, South Africa, and the East Indies, but not in cultivation in this country, so far as I know.

B. TETRASTICHÆ.—Leaves (and bracts) in four rows.

3. *Selaginella uliginosa*, Labill. From Australia and New Zealand. Not uncommon in gardens and nurseries under the name of *Lycopodium uliginosum.* A very easily distinguished species, of long slender form, with long stiff leaves arranged in four rows, the leaves being opposite, and decussate.

4. *Selaginella pumila*, Spring. (*Lycopodium pumilum*, Schlecht. *L. pygmæum*, Kaulf. *L. bryoides*, Kaulf.) A very small South African species, of which I have only seen dried specimens.

II. DICHOTROPÆ, A. Br. (*Heterophyllæ*, Spr.)

Leaves dimorphous, in four rows; bifarious.

A. TETRAGONOSTACHYÆ, Hook. and Grev.—Bracts homomorphous; spikes tetragonal.

(*a*) *Continuæ*, Spr.—Stem not jointed (continuous); rootlets posterior.

a. REPENTES.—*Surculi creeping; rooting everywhere; growing continuously and indefinitely in length, or, with the growth interrupted, and producing buds (innovations) at the apex; leaves dimorphous, bifarious.*

* *Sparsely branched; spikes terminal.*

5. *Selaginella apus*, Spr. (*L. apodum*, L., *L. brasiliensis*, Raddi). A well-known garden species, occurring in small green tufts. A native of North America.

6. *Selaginella Ludoviciana*, A. Br. (*S. apus*, *γ. denticulata*, *S. apothesa*, *S. apotheca*, *S. Louisiana*, Hort.) A much larger species than *S. apus;* the leaves with a white margin. A native of the southern part of North America. (*S. apothecia*, Hort. Veitch.)

** *Widely branched; spikes branchlike.*

7. *Selaginella Helvetica*, Link. A South European species, but not so common in gardens as it should be.

8. *Selaginella denticulata*, Link. (*S. obtusa, obtusata*, Hort.) Also from the south of Europe; like *S. Helvetica*, and quite distinct from the *S. denticulata* of gardens.

*** *Pinnately branched; spikes at the ends of the branchlets.*

9. *Selaginella delicatissima*, A. Br. In gardens as *S. microphylla*. A little like *S. apus*, but with very minute leaves. Its native country is unknown.

10. *Selaginella serpens*, Spr. From Jamaica, Cuba, and Mexico. Very abundant, under the names *S. mutabilis, variabilis*, and *Jamaicensis*, Hort. (*S. argentea*, Hort. Veitch.) The colour of this species varies at different times of the day. The large leaves are ovate.

11. *Selaginella sarmentosa*, A. Br. (*S. Whartoni*, Hort., *S. patula*, Spr.?) A West Indian species not common in gardens; not unlike the preceding, the leaves, however, narrower.

12. *Selaginella uncinata*, Spr. (*S. cæsia*, Hort.) A well-known bluish-green coloured species from China.

13. *Selaginella Breynii*, Spr. (*S. Panamensis*, Hort., *Pœppigiana*, Hort. Van Houtte.) A very pretty South American species, but not in cultivation in this country.

β. ADSCENDENTES.—*Surculi ascending, often sending off aerial roots; branches pyramidal or fastigiate.*

* Persistentes.—*Perennial, producing buds (innovations) from the unchanged apices of the surculi.*

14. *Selaginella Martensii*, Spr. A very variable species from Mexico and Brazil.

(α) *S. Martensii*, var. *normalis*, A. Br. (*S. Martensii, stolonifera, sulcata, decomposita*, and *pulla*, Hort.)

(β) *S. Martensii*, var. *flaccida*, A. Br. (*S. alata, circinalis*, Hort.)

(γ) *S. Martensii*, var. *compacta*, A. Br. (*S. Huegelii, Danielsiana, monstrosa, asplenifolia, formosa, robusta*, Hort.)

(δ) *S. Martensii*, var. *divaricata*, A. Br. (*S. dichotoma, flexuosa*, Hort.)

(ε) *S. Martensii*, var. *congesta*, A. Br. (*L. ramosum, compactum*, Hort. Rollison.)

The supposed hybrid *Selaginella* raised by Mr. Scott, and described in the Botanical Society's Transactions, is a cross between *S. Martensii*, var. *normalis*, and *S. Martensii*, var. *compacta* (*Danielsiana*, Hort.).

There are also variegated specimens of the *S. Martensii* in cultivation.

15. *Selaginella atroviridis*, Spr. A very handsome dark-green species introduced from Borneo by Messrs. Veitch and Sons.

** Redivivæ.—*Ends of the upper or lower branches flagelliform or bulbiferous.*

16. *Selaginella ciliata*, A. Br. (*S. Warszewicziana*, Hort. Berol.) A South American species, not in cultivation in this country.

17. *Selaginella increscentifolia*, Spr. Also from South America, but not in cultivation here.

γ. Proceræ.—*Surculi ascending, erect, or climbing; of indefinite length; branches definite, frondiform, at the base (or at opposite side) soboliferous.*

* *Erectæ.*

18. *Selaginella inæqualifolia*, Spr. An East Indian species, apparently rare in collections.

** *Scandentes.*

19. *Selaginella lævigata*, Spr. A very common species from the East Indies, known as *S. cæsia arborea*. It resembles *S. cæsia* in the colour of the frond, but in no other particular.

δ. Caulescentes.—*Surculi erect, rooting at the base, and sending off hypogeal or epigeal stolons; below, simple; above, branching and expanding in the form of a frond of definite shape. Leaves on the primary axis often homomorphous.*

20. *Selaginella caulescens*, Spr. A handsome species from the West Indies. A small variety, *β. minor*, in Hort. Kew.

21. *Selaginella Japonica*, Moore, Hort. Chels. (*S. involvens*, Hort., not Spring.) This species was sent home from Japan by Mr. Fortune, and is in cultivation under the name *S. involvens*. It belongs apparently to the *Caulescentes*. It is a small fine-leaved species, with the spikes of

fruit peculiarly curled. Mr. Moore has it in the Botanic Garden, Chelsea, labelled *S. Japonica*. It is an undescribed species, and I have accordingly allowed Mr. Moore's name to stand. It is not to be confounded with *S. involvens*, Spring, a species newly introduced from Japan by the Messrs. Veitch, and one of the *Rosulatæ*.

22. *Selaginella erythropus*, Spr. (*L. umbrosum*, Hort., *S. Warszewiczii*, Hort. Veitch.) A small-leaved, red-stalked species from South America; not uncommon in collections.

23. *Selaginella viticulosa*, Kl. (*S. reticulata*, Hort. Jackson, *S. erythropus*, Hort. Veitch.) A very pretty species, not unlike *S. erythropus*, but the stalks are green, and the under-surface is a beautiful silvery-white colour. It is a native of Columbia, in South America.

24. *Selaginella flabellata*, Spr. A native of the West Indies and South America. Apparently rare in collections.

25. *Selaginella conferta*, Moore. A very pretty species, introduced from Borneo by the Messrs. Veitch.

26. *Selaginella hæmatodes*, Spr. (*S. filicina*, *Karsteniana*, Hort., *S. Warszewiczii*, Hort. Edin.) A red-stalked species from Columbia, South America; easily distinguished from *S. erythropus* by its large size, more robust habit, and much larger and more distant leaves.

27. *Selaginella Griffithii*, Spr. Borneo. Introduced by the Messrs. Veitch, but still rare in collections.

28. *Selaginella Lyallii*, Hook. and Grev. A very distinct species, from Madagascar, and not easily confounded with any other at present in cultivation.

29. *Selaginella Wallichii*, Spr. A very elegant species, introduced from Penang by the Messrs. Veitch, and now extensively cultivated. It is closely allied to the next species.

30. *Selaginella Lobbii*, James Veitch. Very close to *S. Wallichii*, but the leaflets more distant, and the *folia minora* more lanceolate. It is also handsomer, and is probably the finest *Selaginella* in cultivation. It was sent home from Borneo by Mr. Lobb, collector for Messrs. Veitch and Sons.

31. *Selaginella Pervillei*, Spr. (*S. Africana*, Hort.) This species

is very common under the garden name of *S. Africana*. A native of the island of Nosi Beh, near Madagascar. It is apparently confounded with the next species *S. Vogelii*, from Fernando Po. I have a specimen from Mr. Smith, from the Royal Gardens, Kew, named "*S. Africana*, Br., West Africa," which is certainly *S. Vogelii*.

32. *Selaginella Vogelii*, Spr. This species is cultivated in the Botanic Garden, Edinburgh, as "*Selaginella* sp., Old Calabar, Dr. Hewan.". It closely resembles the preceding species. The *Selaginella triangularis*, Hort. Edin., is apparently this species. It is probable that this species was received at Kew from Mr. Mann, when collecting at Fernando Po, and been cultivated as the *S. Africana*. The country, "West Africa," marked on the label, gives this additional weight. *S. Vogelii* is a very pubescent species.

33. *Selaginella pubescens*, Spr. This is a well-known species, long cultivated as the *S. Willdenovii*. It is a native of the East Indies. I possess a specimen from Kew Gardens, marked *S. Pogellii*. This is probably a mistake for *S. Vogelii*, and might be due to an accidental change of the label of the plant growing in the garden.

ε. Rosulatæ.—*Surculi arranged in a spiral manner around a central axis, generally rolling in when dry.*

34. *Selaginella cuspidata*, Link. (*S. cordifolia*, *Avilæ*, *palusiana*, Hort.) A very pretty species, from Mexico, Guatemala, and Columbia, common in gardens. There are two well-marked forms of it, the true *cuspidata*, and a large form, var. β, *elongata*, Spr. This last var. is the *S. cordifolia* of the Hort. Edin.

35. *Selaginella convoluta* (Walker-Arnott), Spr. (*S. paradoxa*, Hort.) A small species, common in gardens. It is a native of Brazil, Guiana, and Columbia.

36. *Selaginella involvens*, Spr. This is for the first time recorded as cultivated in this country. It was introduced from Japan by J. Gould Veitch, Esq. This is the true *S. involvens* of Spring, and must not be confounded with the *S. involvens*, Hort., which is the *S. Japonica* of Moore, Hort.

Chels. The fronds are four or five inches long, of a fine green colour, and with a dark brown streak in the back of the branch. The posterior edges of the *folia majora* are also brown. It will, no doubt, be a great acquisition. Messrs. Veitch, of Chelsea, possess the only plants yet introduced, and I am indebted to their kindness for a specimen of it.

37. *Selaginella Veitchii*, mihi. Surculis numerosissimis, rosulatim confertis, patentibus, siccitate involutis, inæqualiter dichotomis, fastigiatis; foliis distantibus, glabris, nitidis, lateribus recurvatis, ovatis, falcatis, cuspidatis, remote serrulatis, basi inæqualiter cordatis, marginibus internis scariis; intermediis vix minoribus lanceolato-falcatis, cuspidatis, remote serrulatis, nervo lineari prominente; bracteis e basi ovata, longe acuminatis, serratis, albo-marginatis.

This species was introduced from Japan by Mr. J. Gould Veitch, to whom I have dedicated the species. It resembles *S. involvens*, but is easily distinguished by its much are more lax habit and more distant leaves. The leaves of *S. involvens* are more acuminate, while those of *S. Veitchii* are more ovate-falcate, the leaves bulging out greatly to the outer side. The *folia minora* are also more lanceolate than those of *S. involvens*. The bracts are larger and more acuminate in *S. Veitchii* than in *S. involvens*. The macrospores are yellow, $\frac{15}{1000}$ of an inch in diameter; the microspores are of bright vermilion-red, and $2\frac{1}{2}$-1000ths of an inch in diameter.

38. *Selaginella pilifera*, A. Br. This is the *S. lepidophylla* of gardens. It is quite distinct from the *S. lepidophylla* of Spring, so well known for its curious hygroscopic properties. It is supposed to be a native of Texas.

(*b*) *Articulatæ*.—Stem below each bifurcation with a joint-like swelling; rootlets anterior.

a. Repentes.

* *Widely branched.*

39. *Selaginella Kraussiana*, Kunze. (*S. hortensis*, Mett., *denticulata*,

Hort.). This species is the one so long known as *S. denticulata*. Professor Braun has shown that this species, when introduced, was thought to be the *L. denticulatum* of Linnæus, and was even so described by Spring. Mettenius in 1856 (Filices, Hort. Bot. Lips.) discovered that it was not *L. denticulatum* of Linnæus, but one of the *Articulatæ* section, and described it as *L. hortense*. Professor Braun has identified it with the South African *L. Kraussianum* of Kunze (Linnæa, xviii., 1844, p. 114). Spring had in his monograph confused *S. Kraussiana* with *S. mnioides*.

** *Pinnately branched.*

(To this division the true *S. stolonifera* belongs. It is a West Indian species, and is not yet in cultivation in Europe. The *S. stolonifera* of gardens is *S. Martensii.*)

β. Adscendentes.

40. *Selaginella Galeottii*, Spr. (*S. Schottii*, Hort.) A well-known garden species, which has been long in cultivation. It is a native of Mexico and Panama.

41. *Selaginella sulcata*, Spr. A very common Brazilian species, but not in cultivation in this country. Professor Braun says it is cultivated in the St. Petersburg Garden. It resembles *S. Martensii*, and might be easily confounded with it, if the articulated nature of *S. sulcata* were not kept in mind.

42. *Selaginella affinis*, A. Br., is also included in Braun's list as *S. Pœppigiana*, Hook. and Grev., but I have not met with it. It is a South American species.

B. Platystachyæ.—Bracts dimorphous, bifariously expanded; spikes compressed.

(*a*) *Pronæ.*—Posterior bracts largest; spikes not resupinate.

(*b*) *Resupinatæ.*—Anterior bracts largest; spikes resupinate.

43. *Selaginella stenophylla*, A. Br. (*S. microphylla*, Hort.) This species is a well-marked one, the large anterior bracts of the spikes at once distinguishing it. I have only seen it in Messrs. Jackson's Nursery. It is a native of Mexico.

44. *Selaginella rubricaulis* (Moore), A. Br. This is an African

species, belonging to the same section as *S. stenophylla*, from which it is easily distinguished by its red stem, more pointed leaves, and narrower *folia minora*.

NOTES ON TWO SPECIES OF THE GENUS ALSTONIA, FROM NEW CALEDONIA AND NEW SOUTH WALES.

By George Bennett, M.D., F.L.S., etc.

The Natural Order of plants, *Apocynaceæ*, contains the Tanghinia Poison-tree of Madagascar (which is naturalized in Sydney, New South Wales, flowering and fruiting well), the *Strychnos* or *Nux-vomica*, the *Oleander*, and many others of a highly poisonous nature; yet the same Order includes the Hya Hya or Milk-tree of Demerara (*Tabernæmontana utilis*), the Cream-fruit of Sierra Leone (*Roupellia grata*), —the latter a very handsome and fragrant plant, remarkable for the size and beautiful colour of its flowers, its agreeable odour, and its edible fruit,—and many others. *Alstonia* belongs to this Order, and one species, *Alstonia edulis*, is indigenous to New Caledonia. It is a climbing plant, the fruit-pods of which are much used in that country, both by the aborigines and Europeans, as an esculent vegetable, and might, with equal advantage, be introduced into the colony of New South Wales. Some of the pods which had been sent to me, I had cooked, and although no correct estimate could be formed of what they might have been when fresh, still they had an agreeable flavour. The pods were brought from New Caledonia by my friend, Mr. D. N. Joubert, who also kindly gave me the following particulars respecting them:—"The *Alstonia edulis* is a creeper found growing most luxuriantly in all the thick scrubs along the banks of freshwater streams, it runs up the stem and branches of the large trees; the leaf is heart-shaped, and of a dark green colour; the fruit grows in clusters, has a downy skin, and, when detached from the plant, a large quantity of milky juice exudes from it, resembling caoutchouc, or india-rubber. The natives in the vicinity of Port de France call it 'jecko,' and use it as food uncooked. I have often eaten it in that state, and it reminded me very much of the taste of the young artichokes eaten saw in France, or of the heart of the Palm-tree. I have also eaten

it boiled, prepared with oil and vinegar, or in curry, and always found it a very palatable vegetable. You cannot form any correct idea of it from the specimens I sent you, no more than you would from any other green vegetable gathered a month or six weeks before being used. I consider it ought not to be kept more than a few days." The other species of *Alstonia* to which I would refer is the *A. constricta*, or "Bitter Bark-tree" of the colonists of New South Wales, large quantities of the bark of which were sent a few years ago to England, with the idea that it would form a substitute for quinine. It grows abundantly about the Clarence and Richmond rivers; it is usually from 25 to 30 feet in height, with a circumference of 3 feet, but in favourable situations it attains an altitude of from 40 to 50 feet. The foliage is bright green, and the flowers are small, in terminal corymbs, and of a very light yellow colour; the bark is of a greyish colour. The bark is much used as a tonic, and by the publicans of the districts, where it is indigenous, is prepared and sold as "bitters." From having an intensely bitter taste, it has been supposed to possess an alkaloid, which may prove a substitute for quinine; but to my taste it closely resembles the peculiar and intense bitter of Quassia, for which it may more probably become a substitute. Mr. J. F. Wilcox, of Grafton, has sent to the Paris Exhibition of 1867, samples of the bark and outer wood, and also a bottle of the decoction. The native name of the tree at the Clarence, is said to be "Lecambil."

CORRESPONDENCE.

Dr. Mueller's Monograph of the Euphorbiaceæ.

M. Alph. De Candolle, in a letter dated 3rd April, 1867, writes to us:—

"Le *Journal of Botany* de Décembre 1866, p. 388, après avoir parlé du volume du *Prodromus* concernant les Euphorbiacées, et avoir critiqué certaines innovations du Dr. Müller en fait de nomenclature, ajoute: 'We trust M. De Candolle will hesitate before he permits such a source of confusion a permanent admission to the Prodromus.' Dans un article de l'*American Journal of Science*, transcrit dans le numéro de Mars 1867 du *Journal of Botany*, le Professeur Asa Gray présente des réflexions un peu analogues.

"Les estimables auteurs de ces critiques ne paraissent pas avoir connu suffisamment la position des directeurs successifs du *Prodromus* à l'égard des divers

collaborateurs. Ni mon père ni moi n'avons examiné les travaux qui nous étaient remis, avant de les livrer à l'impression. Notre rôle a été simplement de nous adresser à des auteurs connus ou désireux de faire un travail monographique, du lui procurer autant que possible les matériaux nécessaires, et plus tard de transmettre les manuscrits au libraire, en laissant à chacun la responsabilité de son œuvre. M. Seringe, anciennement conservateur de notre herbier, et ensuite le Dr. Müller, ont été traités comme les autres collaborateurs. Nous n'avons point corrigé leurs manuscrits. Si l'on veut connaître nos idées sur tel ou tel point, il faut voir les articles que nous avons rédigés nous-mêmes, et non ceux que nous avons édités. C'est ce que j'ai cherché à faire comprendre en mettant au haut de chaque page le nom de l'auteur de chaque article. Pour les innovations du Dr. Müller en fait de nomenclature, je ne les ai pas adoptées, malgré certains motifs de stricte exactitude qu'on pourrait faire valoir en leur faveur. Chacun usera de la même liberté que moi, à cet égard, et fera ce qu'il croira le plus convenable; mais avec le même sentiment d'impartialité, je désire faire une remarque. Il est extrêmement facile, quand on a le texte du Dr. Müller sous les yeux, de savoir quel a été le premier auteur d'un nom générique ou spécifique, ce qui dans beaucoup d'ouvrages rédigés selon la méthode ordinaire n'est pas aisé.

"Ainsi j'ouvre le volume à la page 512, et je vois CROTON, *Müll.*, etc.; mais je vois aussi en suivant la ligne: *Croton, L., pro parte.* Par conséquent je puis, en citant le *Prodromus*, dire selon l'usage: CROTON, *L., pro parte; Müll. in DC. Prod.*, etc. Je n'ai pour cela aucune recherche à faire, tandis que certains botanistes mentionnent des genres anciens ou des sections sans indiquer les noms d'auteur, ou font avec des noms de genre des sections, sans expliquer la nature du changement, ce qui est obscur et incommode. Dans les espèces, le Dr. Müller a toujours indiqué, au moins sous une variété, le premier auteur du nom spécifique; ainsi on peut toujours le rétablir à la suite du nom principal si on le veut: *Croton insularis* (p. 527); et quelques lignes plus bas, sous la variété *genuinus* on voit que Baillon a fait le premier le nom spécifique. L'auteur donne toujours les éléments de la question, avec lesquels on peut suivre ou ne pas suivre sa méthode. On pourrait se fâcher avec plus de justice, peut-être, contre beaucoup d'auteurs qui se servent de l'ancienne méthode sans y mettre autant de précision et de clarté.

"Après tout, ce sont des détails de forme. Je ne crains pas de dire, pour le fond, que le Dr. Müller s'est donné beaucoup de peine; qu'il a rapproché pour la première fois des échantillons authentiques d'Euphorbiacées, très-nombreux et très-dispersés; qu'il a pesé longtemps la valeur relative des caractères; en un mot, qu'il a fait pour une grande famille un véritable travail monographique.

"Ce genre de travaux est toujours rare. Comme preuve, je dirai que le prix quinquennal de 500 francs (£20), fondé par mon père, pour 'la meilleure monographie inédite d'un genre ou d'une famille de plantes' qui serait envoyée à la Société de Physique et d'Histoire Naturelle de Genève, n'a pas pu être adjugé en 1866, parce qu'on n'a pas envoyé de travail monographique, malgré les annonces qui avaient été mises dans tous les journaux botaniques cinq ans auparavant. La Société a décidé de proposer un prix semblable pour le laps de

trois ans. Ainsi je vous prierai, Monsieur, de vouloir bien annoncer dans votre journal, que le sus-dit prix sera adjugé *à la meilleure monographie inédité, rédigée en français ou en latin, d'une famille ou d'un genre de plantes, qui sera adressée, avant le 1er juillet* 1869, *à la Société de Physique et d'Histoire Naturelle de Genève.* Je me chargerai, volontiers, de transmettre à la Société les mémoires qui me seraient adressés dans ce but."

BOTANICAL NEWS.

A new Edition (the Sixth) of Professor Babington's 'Manual of British Botany' is advertised as nearly ready.

Dr. Goeppert has sent to the Paris Exhibition a series of twenty-nine photographs of the characteristic fossil plants of the Silesian coal-field. These photographs are also published by Maruschke and Berendt, of Breslau, with letter-press descriptions by Dr. Goeppert, at the price of thirty-five thalers. The specimens photographed are carefully chosen by Dr. Goeppert from his very extensive palæontological collection, which contains no fewer than 12,000 specimens of fossil plants. His numerous original memoirs, and his very extensive acquaintance with the flora of the coal measures ensure that the selection is a judicious one, and one that will exhibit the ripe opinions of the distinguished Professor. The work must be consulted by every one who is engaged in investigating the fossil plants belonging to this period. It is fortunate that the species illustrated are nearly all common to the coal-fields of Britain and Silesia. The photographs represent the fossils of the original size.

ADDENDA to M. Carroll's List of Iceland Plants :—*Lecanora cervina* (Pers.) Ach., var. *smaragdula* (Wahl.), Fr. On lava from Hellischeidr.

AIMÉ BONPLAND.—We extract the following from an account of a trip to Corrientes, by T. J. Hutchinson, published in a recent number of the 'Liverpool Daily Post :'—

"The saddest recollection of my visit to Corrientes is that connected with my inquiries about the distinguished botanist M. Amado Bonpland, and my having ascertained that he is almost forgotten in the place. Bonpland died in 1858, at his estancia in the territory of Missiones, near a town called Mercedes, about fifty leagues east from Corrientes city. There he had a grant of land of four leagues in extent given to him by the Provincial Government, at the time that Don Juan Pujol was governor of this province in 1854. He was at this time appointed by Governor Pujol to be director-in-chief of a museum of the natural products of the province, just created in the capital. His reply, accepting the post, seems to me worthy of being preserved. It is dated Santa Anna, 27th October, 1854, and is addressed to the Governor in the following words :—

"'I should wish to be younger, as well as more worthy to fill the situation of director-in-chief of the Museum or Permanent Provincial Exhibition that your Excellency has deigned to offer me. Although I am now three months be-

yond eighty years of age, I accept with gratitude the honourable position placed at my disposal; and I pledge myself to employ all my powers in fulfilling the numerous duties exacted by an institution calculated to be so useful to the people of Corrientes, to whom, as well as to your Excellency, the honoured founder of this museum, I owe numberless obligations.

"'The greatest richness of this province, known up to the present time, exists in its vegetable kingdom. In the Argentine Republic, as well as in Paraguay, and the Banda Oriental, I have collected a herbarium of more than three thousand plants; and I have studied their properties with the most careful attention. This work, in which I have been employed since 1816, will be very useful when I come to arrange our vegetable collection; and I hope in a short time to place in the Museum of Corrientes a herbarium that will be as useful as your Excellency need desire, towards encouraging in the minds of your fellow-citizens an ambition to study the natural products of their country.

"'As to the mineral kingdom, there is no doubt that with the advance of time our mines of silver and gold will be worked with much advantage, when we have a more numerous population, and labour is carried on according to better rules than those which now exist. Although quicksilver was discovered many years ago in the immediate neighbourhood of La Cruz, still the predecessors of your Excellency have neglected the glory of utilizing this metal, which is so useful for amalgamation with gold and silver. It seems to me desirable to explore, as soon as possible, the three small hills which overtop the town of La Cruz, for there may be discovered the fountain of this quicksilver. If, as I hope, we can ascertain with accuracy the position of this mine, it will prove an invaluable treasure to serve for the amalgamation of the numerous products of gold and silver that at the present time are being worked with so much zeal all through the Argentine Republic.

"'The animal kingdom is very abundant in the province, but as yet we have only a superficial knowledge of it. Therefore much interesting information can be elicited, as well as a good collection formed, by an assiduous study of this branch of knowledge.—God bless your Excellency, etc.,

"'AMADO BONPLAND.'

"The statements in the foregoing letter, that the writer was eighty years and three months old when he accepted the post of director-in-chief of the Corrientes Museum, and that he had collected a herbarium of more than 3000 plants, made me very anxious to know something of the result of his labours up here. I found that his name is remembered; that's all. No one in Corrientes from whom I inquired on the subject knows the former *locus in quo* of the museum, although it was established only twelve years ago, and of the whereabouts of Bonpland's collection they are equally ignorant. Such is fame in South America!"

BOTANICAL SOCIETY OF EDINBURGH.—*Thursday, April 11th.*—Isaac Anderson-Henry, Esq., President, in the chair. Professor Balfour recorded the deaths of the following members of the Society, which had taken place since last meeting:—1. John Stewart, F.R.S.E., Esq., of Nateby Hall, Lancashire. 2. Prideaux John Selby, Esq., of Twisel, Northumberland, the well-known

author of 'British Forest Trees,' who died at Twisel House on the 27th March last, aged seventy-nine; and 3. Mr. David Tennant, an associate of the Society, died at Pittenweem, on 22nd March last, in the seventy-eighth year of his age. He was the younger brother of the late Professor Tennant, of St. Andrew's, and was for thirty-seven years schoolmaster at Denino. The following communications were read:—1. On Silicified Vegetable Structures from the Zambesi. By Dr. John Lowe, Lynn. While examining some mud brought from the neighbourhood of the Zambesi Falls, and given to him by Mr. Baines, Dr. Lowe's attention was arrested by some peculiarly-shaped bodies, which appeared in great numbers. They presented a variety of well-defined and constant forms, and at first he had considerable difficulty in determining their nature. After repeated examination he found some of them arranged together in their natural positions, which showed that they were silicified plant-cells. The mud had been boiled for a long time in nitric acid, and subsequently in liquor potassæ. The bodies in question then appeared as transparent siliceous particles mixed with some fine *Diatomaceæ*. The author described the various forms met with. 2. On the Progress of Cinchona Cultivation in India. By an Indian Correspondent. Communicated by Professor Balfour. 3. Notice of Cinchona Planting in the Kangra Valley. By William Coldstream, Esq., B.A. The Kangra Valley is situated at the foot of the lofty Chumba Hills, whose peaks rise, at a distance of four or five miles, to the height of 14,000 or 16,000 feet. The first experiment was begun some two years ago in a sheltered ravine above 5000 feet above the sea, in the midst of a forest of "chil." There the plants grew luxuriantly, but last winter a heavy fall of snow covered them and killed them all. In the beginning of 1866 ground was bought some six miles lower down the slope of the valley, at an elevation of about 4000 feet, where the snow never lies. Ten acres have been planted, and a large number of the plants are looking most vigorous. 4. On New Zealand "Carrageen." By W. Lauder Lindsay, M.D. Dr. Lindsay, in a memorandum appended to a paper on Otago Algæ, printed in the Society's 'Transactions' for last session, expressed the opinion that the seaweed variously designated by New Zealand settlers "Carrageen," "Irish Moss," "Edible Seaweed," and "*Chondrus crispus*," would probably prove to be a species of *Gigartina*. A note subsequently received by the author from Mr. Cooke, of the India Museum, London, confirms that opinion, and makes it probable that all the various designations above given apply to the same New Zealand species, *Gigartina livida*, which is abundant on the Greenisland coast of Otago. Such designations as "Carrageen" furnish a good example of the confusion, if not error, arising from the application to New Zealand plants, by the settlers, of the vernacular names of British plants to which the New Zealand plants in question are supposed to possess some resemblance, either as regards their uses or appearance. A similar instance among cryptogams is to be found in the term "orchella weed." Among phanerogams, illustrations of this mal-appropriation of terms are much more numerous and striking. 5. On the Botany of the "Jardin" of Mont Blanc. By Dr. Buchanan White. In this communication the author gave an account of an excursion which he made to the "Jardin" on Mont Blanc, in September, 1866. In a paper by Professor Martins in the

Mémoires for 1865 of the Academy of Sciences of Montpellier, he stated the Phanerogamia to be 87 in number; Musci, 16; Hepaticæ, 2; Lichens, 23; making a total of 128 plants. In my visit I found in flower 45 of the species given in Professor Martins's list, and 4 species not mentioned therein; one Fern, *Allosorus crispus* (not mentioned by him), and one species of *Agaricus*. The Mosses and Hepaticæ I have not yet examined, but of the former I have at least 26 species, and of the latter 3. 6. Notes on *Grimmia subsquarrosa*, Wils. MS. By Dr. Buchanan White. Dr. White gave a description and exhibited specimens and drawings of a Moss which he had recently found growing abundantly on trap rocks near Perth. He had transmitted specimens of it to Mr. Wilson, who had decided it to be a species of *Grimmia* new to science, and proposed that it should be called *G. subsquarrosa*. 7. Note on the Occurrence of *Buxbaumia indusiata* in Aberdeenshire. By Professor Dickie. Dr. Dickie, in examining some specimens in his collection, marked "*Buxbaumia aphylla*," and which had been collected by Mr. A. Cruickshank in July, 1847, in a fir wood near Ballater, discovered that they were not that species, but the still rarer one *B. indusiata*. This moss was reported at the last meeting of the Society as having been lately discovered in Ross-shire by Mrs. Captain Clark, and to be new to the Scottish flora. 8. Extracts from Botanical Correspondence. By Mr. John Sadler. Mr. Sadler read extracts from various letters which he had lately received from botanical correspondents:—(1.) Mr. John Dawson, reporting the discovery of *Gagea lutea* on the banks of the Tay, near Perth. (2.) Mr. Charles Howie, Largo, noticing the disappearance of *Bryum Warneum* from Tent's Muir, and the occurrence of *Campylopus alpinus* abundantly on Ben Wyvis. (3.) Mr. James Hardy, recording the discovery lately of several Mosses new to the Berwickshire flora, such as *Pottia crinita*, *Anacalypta lanceolata*, *Buxbaumia aphylla*, *Orthotricum phyllanthum*, etc. (4.) Dr. Dickie, sending specimens of *Pottia crinita* collected on the coast near Aberdeen. 9. Report on the State of the Open-air Vegetation in the Royal Botanic Garden. By Mr. M'Nab. The cold frosty winds of March have proved very detrimental to the foliage of many of the evergreen shrubs, as well as to the points of numerous coniferous trees, by causing them to become much browned. It will be observed, from the floral calendar appended, that April has effected an improvement. The list given does not include all the species now in flower, but those only which I am in the habit of annually marking. Although vegetation at the present time is considerably behind the average of years, still it approximates very near the floral records given last spring:— March 21. *Gagea lutea*. March 22. *Scilla bifolia alba*. March 25. *Scilla bifolia rubra*; *Erythronium Dens-canis*. March 26. *Corydalis cava*; *Corydalis tuberosa rubra*. March 28. *Puschkinia scilloides*. March 31. *Hyoscyamus scopolia*. April 1. *Knappia agrostidea*; *Corydalis solida*. April 2. *Draba aizoides*. April 3. *Ribes sanguineum*; *Rhododendron Nobleanum*; *Narcissus moschatus*. April 4. *Adonis vernalis*; *Hyoscyamus orientalis*. April 5. *Narcissus Pseudo-Narcissus*; *Primula ciliata purpurata*. April 6. *Fritillaria imperialis*; *Primula nivalis*; *Muscari botryoides*. April 7. *Muscari botryoides alba*. April 8. *Hyoscyamus physaloides*. April 9. *Mandragora vernalis*. April 10. *Ornithogalum montanum*.

Fitch, del. et lith.

ON *SALIX GRAHAMI*, *Borrer*, A WILLOW ALLIED TO *S. HERBACEA*, GATHERED BY THE LATE PROF. GRAHAM IN SUTHERLANDSHIRE.

BY J. G. BAKER, ESQ., F.L.S., ETC.

(PLATE LXVI.)

In Mr. Borrer's collection at Kew are three sheets (one from the original wild station, and two from a bush transferred to his garden) of specimens of a willow gathered by the late Professor Graham at Frouvyn in Sutherlandshire, which Mr. Borrer has marked "*Salix Grahami, inedit.*," and again, "Extraordinary variety of *S. herbacea*," which differs considerably from our ordinary *S. herbacea*, and is further interesting as throwing light on the affinity of the latter with *S. polaris*.

The following is a summary of its characters, as shown by these specimens:—Shoots trailing, six to nine inches long, copiously branched, the young branches clothed with adpressed grey silky hairs, the old bark naked and shining purplish-brown. Petioles silky, about an eighth of an inch long. Leaves broad-oblong, or with a slightly obovate tendency, half to three-quarters of an inch long when the plant is in flower, by three-quarters as broad, the under surface thinly clothed with adpressed silky hairs, even the branch veinlets conspicuously raised, the upper surface naked and shining, the base rounded, the apex generally mucronate with the point often twisted, the edge faintly crenate. Catkins terminal on leafy shoots about an inch long, the catkin oblong-cylindrical, lax, about three-eighths of an inch long when in flower, with under a dozen flowers, the scale lingulate, scariose, an eighth of an inch long, ciliated and thinly silky on the back; the pedicel half as long as the scale, densely silky up to the very base of the ovary; the ovary a line long, naked; style equalling the pedicel; stigmas bifid, with linear divisions.

From *S. herbacea* it differs by its stronger growth, the silky branches and under surface of the leaves, densely silky pedicel, and more elongated pedicel and style. *S. polaris*, Wahl., has been universally admitted as a good species, belting the world in arctic and subarctic latitudes, in Europe, says Wimmer,* not passing south of the parallel of 63°. This has a habit and leaf not appreciably different from those

* Wimmer, 'Salices Europææ,' p. 127.

of *S. herbacea*, but the style is more elongated, and both the pedicel and ovary are densely silky. Our *S. Grahami* agrees with this in its elongated style and elongated silky pedicel, but the hairs stop short at the very base of the ovary, leaving the latter quite naked. In both *S. herbacea* and *S. polaris* the leaves are nearly round, quite naked, and generally retuse; in *S. Grahami* they are about three-quarters as broad as long, silky beneath and generally pointed, and the habit of growth is considerably more robust. Of *S. herbacea* Anderson writes:—"Capsulæ occurrunt pilosæ, quales in alpe Dovre Norvegiæ a cl. Lindblom detectæ fuerunt, sed in eadem stirpe etiam glaberrimæ."

Amongst the British Willows we have a very gradual transition between forms with completely naked and densely silky ovaries in *S. nigricans*, *phylicifolia*, and *undulata*, so that in these three, *S. herbacea*, *Grahami*, and *polaris*, botanists disposed to combine may argue, with reason, that we have only three varieties of one species, whilst others will probably consider them distinct.

NOTE ON DOUBLE FLOWERS OF RANUNCULUS FICARIA, ETC.

By Dr. Maxwell T. Masters, F.L.S., etc.

The chief interest attaching to these flowers resides in the structure of the carpels and ovules. Under ordinary circumstances, the laterally compressed carpels are spirally disposed on a nearly globular thalamus, and each contains a single inverted ovule, with the raphe next the placenta; but in the double variety the carpels were found to be open, *i.e.* disunited at the margins, and each bore two imperfect ovules upon its inner surface a little way above the base, and about midway between the edges of the carpel and the midrib, the ovules being partly enclosed within a little depression or pouch, which reminded one of the similar pit on the petals. On closer examination the ovules were found to spring from the two lateral divisions of the midrib, the vascular cords of which were prolonged under the form of barred or spiral, fusiform tubes into the outer coating of the ovule.

The ovules themselves were straight, or partially curved at the

apex, the direction of the curvature being the same in both ovules, thus one ovule looked towards the midrib, the other towards one margin of the carpel, and consisted each of a tubular outer coating of cellular tissue, but traversed, as before said, by a bundle of vascular tissue. This outer coating (primine?) was open at the summit to allow of the passage of the secundine and nucleus which appeared under the form of a little semiglobular knob protruding from the orifice of the primine or as a slightly curved process, the indications of the ordinarily anatropous ovule.

In this instance, then, the ovules did not originate from the margins of the leaf, nor from a prolonged axis, but they seemed to spring, in the guise of little buds, from the inner surface of the carpellary leaf.

The production of two ovules seems noteworthy, as one only is found under ordinary circumstances; and Payer, when writing on the development of the flowers in *Ranunculaceæ* in his 'Organogénie Végétale,' makes no mention of bi-ovulate carpels in this family, but speaks of them all as 1- or pluri-ovulate.

Teratology unfortunately affords little help at present as to the right understanding of the morphology of the ovule and of its coats. In truth, the evidence as to the structure of the ovule is very conflicting, not only in the case of admitted malformation, but also in regular formations. The ovules above described closely resembled in form and position those of the monstrous White Clover described by Caspary, Schrift. d. Physik. Œk. Gesells. zu Königsberg, band ii. p. 51, t. 2 et 3.

Unisexual Ranunculaceæ.

Some of the *Ranunculaceæ* constantly exhibit a tendency towards the diœcious condition, and the rarity with which perfect seeds of *Ranunculus Ficaria* are formed is to be attributed in great measure to the deficiency of pollen in the anthers of these flowers. *Ranunculus auricomus* also is frequently sterile, but I am not aware that *Ranunculus bulbosus* has been recorded with unisexual flowers. I met recently with a luxuriant plant of this species, in which every flower was furnished with carpels, most of which had evidently been fertilized, although there were no perfect stamens in the flowers.

AUSTRALIAN VEGETATION, INDIGENOUS OR INTRODUCED, CONSIDERED ESPECIALLY IN ITS BEARINGS ON THE OCCUPATION OF THE TERRITORY AND WITH A VIEW OF UNFOLDING ITS RESOURCES.

By Ferdinand Mueller, Ph.D., M.D., F.R.S.

The great continent of Australia exhibits throughout its varied zones marked diversities in the physiognomy of its vegetation. These differences stand less in relation to geographical latitudes than to geological formations, and especially climatical conditions. Yet it is in few localities only where the peculiar features, impressed by nature as a whole on the Australian landscape, cannot at once be recognised. The occurrence of eucalypts and simple-leaved acacias in all regions, and the preponderance of these trees in most, suffice alone to demonstrate that in Australia we are surrounded largely by forms of the vegetable world which, as a complex, nowhere re-occur beyond its territory, unless in creations, of ages passed by.

In a cursory glance at the vegetation, as intended on this occasion, it is not the object to analyse its details. In viewing vegetable life here, more particularly as the exponent of clime, or as the guide for settlement, or as the source of products for arts and manufactures, we may content ourselves by casting a view only on the leading features presented by the world of plants in this great country. While the absence of very high and wooded mountains imparts to the vegetation throughout a vast extent of Australia a degree of monotony, we perceive that the occurrence of lofty forest ranges along the whole eastern and south-eastern coast change largely there the aspect of the country, and in this alteration the mountainous island Tasmania greatly participates. Thus the extensive umbrageous forest regions of perpetual humidity commence in the vicinity of Cape Otway, extend occasionally, but not widely interrupted, through the southern and eastern part of Victoria, and thence, especially on the seaside slopes of the ranges, throughout the whole of extra- and intra-tropical East Australia in a band of more or less width, until the cessation of elevated mountains on the northern coast confines the regions of continued moisture to a narrow strip of jungle-land margining the coast. In this vast line of elevated coast-country, extending in length over nearly three thousand

miles, and which fairly may pass as the "Australian jungle," the vegetation assimilates more than elsewhere to extra-Australian types, especially to the impressive floral features of continental and insular India. Progressing from the Victorian promontories easterly, and thence northerly, we find that the eucalypts, which still preponderate in the forest of the southern ranges, gradually forsake us, and that in Eastern Gippsland commences the vast assemblage of varied trees, which so much charms by its variety of forms, and so keenly engages attention by the multiplicity of its interest. Bathed in vapour from innumerable springs or torrents, and sheltered under the dark foliage of trees very varied in form, a magnificent display of the fern-trees commences, for which further westerly we would seek in vain the climatic conditions. Even isolated sentries, as it were, of the fern-tree masses are scattered not further west than to the craters of extinct volcanoes near Mount Gambier; and although colossal *Todea-ferns*, with stems six to ten feet high, and occasionally as thick, emerge from the streamlets which meander through the deep ravines near Mount Lofty, on St. Vincent's Gulf, we miss there the stately palm-like grace of the *Cyatheæ*, *Dicksoniæ*, and *Alsophilæ*, which leave on the lover of nature, who beholds them, the remembrance of their inexpressible beauty. These fern-trees, often twenty to thirty, occasionally fifty to seventy feet high, and at least as many years old, if not older, admit readily of removal from their still mild and humid haunts to places where, for decorative vegetation, we are able to produce the moisture and the shade necessary for their existence. Of all fern-trees of the globe, that species which predominates through the dark glens of Victoria, Tasmania, and parts of New South Wales, the *Dicksonia antarctica* (although not occurring in antarctic regions) is the most hardy and the least susceptible to dry heat. This species, therefore, should be chosen for garden ornaments, or for being plunged into any park glens; and if it is considered that trees half a century old may with impunity be deprived of their foliage and sent away to distant countries as ordinary merchandise, it is also surprising that a plant so abundant has not yet become an article of more extended commerce.

A multitude of smaller ferns, many of delicate forms, are harboured under the shade of the jungle-vegetation, amounting in their aggregate to about 160 species, to which number future researches in North-East Australia will undoubtedly add. The circular *Asplenium*

nidus, or great nest-fern, with fronds often six feet long, extends to the eastern part of Gippsland; but the equally grand staghorn-ferns (*Platycerium alcicorne* and *P. grande*) seemingly cease to advance south of Illawarra, while in Northern Queensland *Angiopteris evecta* count amongst the most gorgeous, and two slender *Alsophilæ* amongst the most graceful forms. The trans-shipment of all these ferns offers lucrative inducements to traders with foreign countries. Epiphytal orchids, so much in horticultural request, are less numerous in these jungle tracts than might have been anticipated, those discovered not yet exceeding 30 in number. Their isolated outposts advance in one representative species—the *Sarcochilus Gunnii*—to Tasmania and the vicinity of Cape Otway, and in another—*Cymbidium canaliculatum*—towards Central Australia. The comparative scantiness of these epiphytes contrasts as strangely with the Indian orchid-vegetation, as with the exuberance of the lovely terrestrial co-ordinal plants throughout most parts of extra-tropical Australia, from whence 120 well-defined species are known. Still more remarkable is the almost total absence of Orchids, both terrestrial and epiphytal, from North and North-West Australia, an absence for which in the central parts of the continent aridity sufficiently accounts, but for which we have no other explanation in the north but that the species have as yet there effected but a limited migration. To the jungles and cedar-brushes—the latter so named because they yield that furniture-wood so famed as the Red Cedar (*Cedrela Taona*, a tree identical, as a species, with the Indian plant, though slightly different in its wood)—are absolutely confined the *Anonaceæ*, *Laurineæ*, *Monimieæ*, *Meliaceæ*, *Rubiaceæ*, *Myrsineæ*, *Sapoteæ*, *Ebenaceæ*, and *Anacardieæ*, together with the baccate *Myrtaceæ*, and nearly all the trees of *Euphorbiaceæ*, *Rutaceæ*, *Apocyneæ*, *Celastrineæ*, *Sapindaceæ*, which, while often outnumbering the interspersed eucalypts, seem to transfer the observer to Indian regions. None in the multitude of trees of these Orders, with exception of our tonic-aromatic Sassafras-tree (*Atherospermum moschatum*) and *Hedycarya Cunninghami*, which supplies to the natives the friction-wood for igniting, pass in the south the latitude of Gippsland. Palms cease also there to exist, but their number increases northward along the east coast, while in Victoria these noble plants have their only representative in the tall Cabbage- or Fan-Palm of the Snowy River, that Palm which, with the equally hardy *Areca sapida* of

New Zealand, ought to be established wherever the Date is planted for embellishment. Rotang Palms (*Calami* of several species) render some of the northern thickets almost inapproachable, while there also on a few spots of the coast the Cocoanut-tree occurs spontaneously. A few peculiar Palms occur in the Cassowary country, near Cape York, and others around the Gulf of Carpentaria as far west as Arnhem's Land. The tallest of all, the lofty Alexandra Palm (*Ptychosperma Alexandræ*), extends southwards to the tropic of Capricorn, and elevates its majestic crown far above the ordinary trees of the jungle. The products of these entire forests is as varied as the vegetation which constitutes them. As yet, however, their treasures have been but scantily subjected to the test of the physician, the manufacturer, or the artisan. The bark of *Alstonia constricta*, like that of allied Indian species, is ascertained to be febrifugal, and also those of *Chionanthus axillaris* and *Brucea Sumatrana*. *Caoutchouc* might be produced from various trees, especially the tall kinds of Ficus. The lustre and tint of the polished wood of others is unrivalled. Edible fruits are yielded by *Achras Australis*, *Achras Pohlmaniana*, *Mimusops Kauki*, *Zizyphus Jujuba*, *Citrus Australis*, *Citrus Planchonii*, *Eugenia myrtifolia*, *Eugenia Tierneyana*, *Parinarium Nonda*, the Candlenut-tree (*Aleurites triloba*), and the cluster Fig-tree (*Ficus vesca*, which produces its bunches of fruit from the stem), also by species of *Owenia* and *Spondias*, and by several brambles and vines. Starchy aliment or edible tubers are furnished by *Tacca pinnatifida*, by several *Cissi* (*C. opaca*, *C. clematidea*, acrid when unprepared), *Marsdenia viridiflora*, *Colocasia antiquorum*, *Alocasia macrorrhiza*, by a colossal *Cycas*, some *Zamiæ*, and several kinds of Yam (*Dioscorea bulbifera*, *D. punctata*, and other species). *Backhousia citriodora* and *Myrtus fragrantissima* yield a cosmetic oil, so also *Eucalyptus citriodora*, a tree not confined to the jungle, and two kinds of *Ocimum*. *Semecarpus Anacardium*, the Marking-nut-tree, is a native of the most northern brush-country. The medicinal *Mallotus Philippinensis* and the poisonous *Excæcaria Agallocha* are more frequent.

Many of the trees of the coast-forests of East Australia range from the extreme north to the remotest south, among them the *Palm-panax*; others, like *Araucaria Cunninghami*, extend only to the northern part of New South Wales, while some, including *Araucaria Bidwillii*, or the Bunya-Bunya-tree, so remarkable for its large edible nutlike seeds,

and the Australian Kauri, *Dammara robusta*, are confined to very circumscribed or solitary areas. The absence of superior spice plants (as far as hitherto ascertained) amidst a vegetation of prevailing Indian type is not a little remarkable, for *Cinnamomum Laubatii* ranks only as a noble timber-tree, and the native nutmegs are inert. The scantiness of acanthaceous plants is also a noticeable fact. *Podostemoneæ* have not yet been found. Many plants of great interest to the phytographer do not seemingly ever quit the north-eastern peninsula, among these the *Banksian banana* (*Musa Banksii*), the Pitcher Plant (*Nepenthes Kennedyana*), the vermilion-flowered *Eugenia Wilsonii*, the curious *Helmholtzia acorifolia*, the Marshal-tree, *Archidendron Vaillantii* (the only plant of the vast Order of *Leguminosæ* with numerous styles), the splendid *Diplanthera quadrifolia*, *Ficus magnifolia*, with leaves two feet long, the tall *Cardwellia sublimis*, the splendid *Cryptocarya Mackinnoniana*, are especially remarkable. *Rhaphidophora*, *Pothos*, *Piper*, together with a host of *Lianes*, especially gay through the prevalence of *Ipomœas*, tend with so many other plants to impart to the jungle part of Australia all the luxuriance of tropical vegetation. Of the two great Nettle-trees, the *Laportea gigas* occurs in the more southern regions, while *L. photinifolia* is more widely diffused. *Helicia* is represented by a number of fine trees far south, some bearing edible nuts. *Doryanthes excelsa*, the tall Spear Lily, is confined to the forests of New South Wales. The flowers of *Oberonia palmicola* are more minute than those of any other orchideous plant, although more than 2000 species are known from various parts of the globe. The display of trees eligible for avenues from these jungles is large. The tall Fern Palm (*Zamia Denisonii*), one of the most stately members of the varied Australian vegetation, is widely, but nowhere copiously, diffused along the east coast. It yields a kind of sago, like allied plants. The beans of *Castanospermum australe*, which are rich in starch, and those of *Entada Pursætha*, from a pod often four feet long, are, with very many other vegetable substances, on which Mons. Thozet has shed much light, converted by the aborigines into food.

If plants representing the genera *Berberis*, *Impatiens*, *Rosa*, *Begonia*, *Ilex*, *Rhododendron*, *Vaccinium*, or, perhaps, even Firs, Cypresses, and Oaks, do occur in Australia as in the middle regions of the mountains of India, it will be on the highest hills of North-East Australia,—namely, on the Bellenden Ker Ranges, mountains still un-

approached through the hostility of the natives, where they will find the cooler and, at the same time, moist tropical climate congenial to their existence. But whatever may be the variety and wealth of the primitive Flora of East Australia, it is only by the active intelligence and exertions of man that the greatest riches can be wrought from the soil. Whatever plants he may choose to raise, whether costly spices, luscious fruits, expensive dyes; whether Cacao, Manihot, or other alimentary plants; whether sugar, coffee, or any others of more extensive tropical tillage,—for all may be found wide tracts fitted for their new home.

The close access to harbours facilitates culture, while the expansive extent of geographical latitude on the east coast admits of choosing such spots as in each instance present the most favourable climatic conditions for the success of each special plantation. Beyond the coast ranges the country westward changes, with augmenting dryness, generally at once into more open pastoral ground. Basaltic downs and gentle verdant rises of eminent richness of herbage may alternately give way to Brigalow scrubs or sandstone plateaux, or porphyritic or granitic hills, and with the change of the geological formation a change, often very apparent, will take place also in the vegetation. Inland we will lose sight of the glossy, dense, umbrageous foliage, which now only borders a generally low coast in the north, terminating there frequently in Mangroves. *Strychnos Nux-vomica* occurs among the coast bushes here, and also an *Antiaris* (*A. macrophylla*); but whether the latter shares the deadly poison of the Upas-tree of Java and Sumatra requires to be ascertained. *Tamarindus Indica* is known from Arnhem's Land, and the French Bean (*Phaseolus vulgaris*) in a spontaneous state from the north-west coast. Eucalypts, again, form away from the sea the prevailing timber; but with exception of the Red Gum-tree (*Eucalyptus rostrata*), which lines most of the rivers of the whole of the Australian interior, the southern species are replaced by others, never of gigantic growth, in some instances adorned with brilliant scarlet or crimson blossoms. But neither these nor many distinct kinds of northern *Acacias* and *Melaleucas* stamp on the country the expression of peculiarity. Familiar Australian forms usually surround us, though those of the cooler zone, and even the otherwise almost universal Senecios, are generally absent. *Cyperus vaginatus*, perhaps the best of all textile rushes, ranges from the remotest south

to these northern regions. *Hibiscus tiliaceus*, with other malvaceous plants, is here chosen by the natives for the fibre of the fishing-nets and cordage. An occasional interspersion of the dazzling *Erythrina vespertilio*, of *Bauhinia Leichardti*, *Erythrophlœum Laboucheri*, Livistonia Palms, many *Terminaliæ*, some with edible fruits, *Cochlospermum Gregorii*, and *C. heteronemum*, remind, however, of the flora of tropical latitudes, which, moreover, to the eye of an experienced observer is revealed also in a multitude of smaller plants, either identical with South Asiatic species or representing in peculiar forms tropical genera. The identity of about 600 Asiatic plants (some cosmopolitan) with native Australian species has been placed beyond doubt; and to this series of absolutely identical forms, as well derived from the jungle as from grounds free of forest, unquestionably several hundred will yet be added.

Melaleuca Leucadendron, the Cajeput-tree of India, is among Indo-Australian trees one of the most universal; it extends, as one of the largest timber trees of North Australia, along many of its rivers, and in diminutive size over the dry sandstone table-lands. The Asiatic and Pacific *Casuarina equisetifolia* accompanies it often in the vicinity of the coast. By far the most remarkable form in the vegetation of North-West Australia is the Gouty-Stem-tree (*Adansonia Gregorii*); but it is restricted to a limited tract of coast country. It assumes precisely the bulky form of its only congener, the Monkey Bread-tree, or Baobab of tropical Africa (*Adansonia digitata*), dissimilar mainly in having its nuts not suspended on long fruitstalks. Evidence, though not conclusive, gained in Australia, when applied to the African Baobab, renders it improbable that the age of any individual tree now in existence dates from remote antiquity. This view is also held by Dr. G. Bennett, of Sydney. The tree is of economic importance. Its stem yields a mucilage indurating to a tragacanth-like gum. It is also one of the few trees which introduces the unwonted sight of deciduous foliage into the evergreen Australian vegetation. Numerous swamps and smaller lakes exist within moderate distance of the coast. As in many other parts of Australia, these waters are surrounded by the wiry Polygonum (*Muehlenbeckia Cunninghami*), and in Arnhem's Land occasionally also by Rice-plants, not distinct from the ancient culture plant. But here, in almost equinoctial latitudes, the stagnant fresh waters are almost invariably nourishing two Water Lilies of

great beauty (*Nymphæa stellata* and *Nymphæa gigantea*), which give, by the gay display of their blue, pink, or crimson shades of flowers, or by their pure white, a brilliant aspect to these lakes; and even the Pythagorean Bean (*Nelumbo nucifera*) sends occasionally its fine shield-like leaves and large blossom and esculent fruits out of the still and sheltered waters. But how much could this splendour of lake-vegetation be augmented if the reginal Victoria, the prodigious Water Lily of the Amazon River, were scattered and naturalized in these lakes, to expand over their surface its stupendous leaves, and to send forth its huge snowy and crimson fragrant flowers. It would add to the aliment which now the natives obtain from these lakes and swamps by diving for the roots and fruits of the *Nymphææ*, or for the tubers of *Heleocharis sphacelata*, of species of *Aponogeton*, or by uprooting the starchy rhizomes of *Typha angustifolia* (the Bulrush), when eager to add a vegetable component to their diet of Unio-shells, or of water-fowls and fishes, all abounding on these favourite places of their resort. *Trapa bispinosa*, already living, like the Victoria, in the tanks of our conservatories, ought, with *Trapa natans*, for the sake of its nuts, not only to be naturalized in the waters of the north, but also in the lagoons and swamps of the south. Around these lakes, Screwpines (*Pandanus spiralis* and *Pandanus aquaticus*) may often be seen to emerge from the banks, the latter,—as recorded already by Leichhardt, always indicative of permanent water. The young top-parts of the stems of these Pandans, when subjected to boiling, become free of acridity, and are thus available in cases of emergency for food. *Opilia amentacea* and the weeping *Eugenia eucalyptoides*, together with a native Cucumber (*Cucumis jucunda*), are here among the few plants yielding edible fruit. Purslane (*Portulaca oleracea*) abounds, and in sandy soil it is found pleasantly acidulous. It will always be acceptable as a salad or spinach, especially in scrofulous affections; and its amylaceous seeds might, in cases of distress, be readily gathered for food. A delicious tall perennial Spinach (*Chenopodium auricomum*) is not unfrequent. Beyond one kind of *Sandarach Callitris*, no Pines exist in the north, except the *Araucaria Greyi*, noticed on a circumscribed spot on the Glenelg river. The true Bamboo (*Bambusa arundinacea*) lines, as far as yet observed, only the banks of a few of the rivers of Arnhem's Land.

To the pastoral settler, for whom more particularly the generally

open *Eucalyptus* country, or the treeless or partly scrubby tracts are eligible, it must be of significance that the fall of rain occurs with frequency during the hottest part of the year. Hence, during the summer, grass and herbage is pushing forth with extraordinary rapidity and exuberance; while a judicious burning at the cooler season, together with the effect of regular dews, is certain to produce fresh forage during the drier months. An almost endless variety of perennial nutritious grasses, allied to Indian species, or even identical with them, are known to exist. The basaltic downs of the north and north-west produce almost precisely the same vegetation which has rendered Darling and Peak downs so famed in the east. This almost absolute identity of plants is a sufficient indication of great similarity of climate, for which the rise of the country, though one not very considerable, to some extent may account. On the ranges which divide the waters of the east coast from those of Carpentaria, the vine luxuriates; its fruit indeed suffers occasionally from frost.

How far the tracts south of the more littoral northern country may continue to bear prevailingly the feature of fertility cannot be predicated. There can be no greater fallacy than to prejudge an untraversed country—a fallacy to which explorers are prone, and which, in some instances, has retarded advancement of geographical discoveries and of new locations of permanent abodes, while, in other instances, it has led to disastrous consequences. A country should be judged with caution. Even from elevations comparatively inconsiderable, such as are generally met with away from the eastern coast, the orb of vision is limited. A traveller may, buoyant with hope, commence his new daily conquest on the delightful natural lawns or the verdant slopes of a trap formation; and before many hours' ride he may, to his dismay, be brought without water to a bivouac between the sand waves of decomposing barren rocks. But as suddenly a few hours' perseverance may bring him again into geological regions of fertility when he least expected it; smiling landscapes may again burst on his view, and he may establish his next camp beside limpid water, sufficient for the requirements of a future city. The nature of a country is not ruled by climate and latitude alone, but quite as much, if not more, by its geological structure. Glancing on the map of an unexplored country, we are apt to take the former alone for a guide in our conjectures, until the latter, by actual field operations, becomes our stronghold in topographical

mapping. It would thus be unsafe to assume that the great western half of the interior consists mainly of desolate uninhabitable desert country, or even to contend that the reappearance on Termination Lake, or on the Murchison river, of so very many of the plants which give to the Saltbush country, or the Mallee and Brigalow scrubs, on the extensive depression of the Darling system, their physiognomy, necessitates their uninterrupted extension from the rear of Arnhem's Land to the Murray Desert, or to Shark Bay. From demonstrating facts like these we dare no more infer but that it is likely many similar tracts of flat country are stretching over portions of the wide intervening spaces. But who will predict more? May not the large system of salt lakes formed by the drainage of rain into cavities of saline flats be found limited to the less distant portions of the interior of Western Australia, and may it not thus, by a gradual rise of the ground (evidently manifest northerly), give place to a system of freshwater lakes or lagoons, or even of such springs as rewarded the exertions of the keenly-searching explorers west of Lake Eyre? And although it must be admitted that no ranges simultaneously lofty and wooded, and thus originating springs and rivulets for the formation of larger rivers, are likely to exist to any extent in the extra-tropical part of the western interior, because such rivers have not found their way to the coast, yet it is still possible, and rather probable, that mountains as high and much less bare than Gawler Range, and even much more extensive, may give rise to interior watercourses, along which the dwellings of new colonists may be established, and to which our pasture animals may flock, but which in their sluggish progress cannot force their way to the ocean, and are thus lost in numerous more or less ample inland basins. Years hence, on even less favoured spots, artesian borings may afford the means of stay for a dense population,—should,as may be anticipated, mineral riches prove to be scattered not merely over the vicinity of the west coast and Spencer's Gulf, but also over interjacent areas of similar geological structure. York's Peninsula, close to settlements, was long left an uninhabited and desolate spot, until its rich store of copper-ore was disclosed. So other unmapped parts of Australia are also likely to prove rich; and, although not equal facilities for the transit of the mineral treasures would always exist, its discovery would be certain to lead to the occupation of the country, and to the extension of pastoral colonization,

until an increasing population and augmented conveniences for traffic could turn mineral wealth, however distantly located, advantageously to account. But how vastly might not any barren tracts of the interior be improved, and how many a lordly possession be founded by patient industry and intelligent judgment! Storage of water, raising of woods, dissemination of perennial fodder-plants, will create alone marvellous changes; and for these operations means are readily enough at command. Even the scattering of the grains of the common British Orache (*Atriplex patulum*), an annual but autumnal plant, would, on the barest ground, realize fodder for sheep; and the number of plants which for such purpose could be chosen are legion. The storage of rain-water might, in any rising valley, be so effected as to render it, simply by gravitation, available for irrigating purposes.

As a curious fact, it may be instanced that in some of the waterless sandy regions of South Africa the copious naturalization of melon-plants has afforded the means of establishing halting-places in a desert country. On the sandy shores of the Great Bight, and also anywhere in the dry interior, such plants might be easily established. The avidity with which the natives at Escape Cliffs preserved the melon-seeds, after they once had recognised the value of their new treasure, holds out the prospect of the gradual diffusion of such vegetable boons over much unsettled country.

No part of Australia has the marked peculiarities of its vegetation so strongly expressed, and no part of this great country produces so rich an assemblage of species within a limited area, as the remotest south-western portion of the continent. Indeed, the southern extremity of Africa is the only part of the globe in which an equally varied display of vegetable forms is found within equally narrow precincts, and endowed also with an equal richness of endemic genera. It is beyond the scope of this brief treatise to enter fully into a detailed exposition of the constituents of the south-western flora. It may mainly suffice to notice such of the vegetable products as are drawn already into industrial use, or are likely to be of avail for the purpose. Foremost in this respect stands perhaps the Mahogany Eucalypt (*Eucalyptus marginata*). The timber of this tree exhibits the wonderful quality of being absolutely impervious to the inroads of the limnoria, the teredo, and chelura, those minute marine creatures so destructive to wharves, jetties, and any work of naval architecture exposed to the

water of the sea. It equally resists the attacks of termites. In these properties the Red Gum tree of our own country largely shares. The Mahogany Eucalypt has, in the Botanic Gardens of this city, been brought for the first time largely under cultivation, and, as clearly the natural supply of this important timber will, sooner or later, prove inadequate to the demanded requirements, it must be regarded as a wise measure of the Governments of France and Italy now to establish this tree on the Mediterranean shores, a measure for which still greater facilities are here locally afforded.

The Tuart (*Eucalyptus gomphocephala*) is another of the famed artisan's woods of south-western Australia. The Karri Eucalypt (*Eucalyptus colossea* or *diversicolor*) attains in favourable spots a height of 400 feet. *Eucalyptus megacarpa* constitutes the Blue Gum tree, which rivals with that of Tasmania and Victoria in size, but is otherwise very distinct. Its timber, as well as that of the Tuart, on account of their hardness, are employed for tramways and other works of durability. The fragrant wood of several species of Santalum forms an article of commercial export. Some kinds of Casuarina, quite peculiar to that part of Australia, furnish superior wood for shingles and for a variety of implements. Several species of Acacia, especially *Acacia acuminata*, the Raspberry-scented Wattle, equally restricted to the south-west coast, yield fragrant and remarkably solid wood and a pure gum. To this part of Australia was naturally also restricted the *Acacia lophantha*, which has, for the sake of its easy and rapid growth and its umbrageous foliage, assumed such importance even beyond Australia for temporary shelter-plantation. Many other products, such as gum-resins, sandarach, tanner's bark, all of great excellence, are largely available; but these substances show considerable similarity to those obtained in other Australian colonies.

The extraordinary abundance, however, of the *Xanthorrhœas* through most parts of the south-west territory gives special interest to the fact (1845) promulgated by Stenhouse, that anthrazotic, or nitro-picric acid—a costly dye—may, with great ease and little cost, be prepared from the resin of these plants. Indeed, this is the richest source for this acid, the resin yielding half its weight in dye. Fibre of great excellence and strength is obtained from the bark of *Pimelea clavata*, a bush widely distributed there. It resembles that of bast from *Pimelea axiflora* in Gippsland, and that from *Pimelea microcephala* of the

Murray and Darling Desert. A fern-palm (*Zamia Fraseri*) attains in West Australia a height of fifteen feet. It is there, like some congeners of America and South Africa, occasionally sacrificed for the manufacture of a peculiar starch, though the export of the stems (and perhaps of those of the *Xanthorrhœas* also) would prove much more profitable, inasmuch as these, when deprived of their noble crown of leaves, though not of their roots, will endure a passage of many months, even should the plants be half a century old. Such specimens any wool-vessel might commodiously take to Europe. This alimentary fern-palm, well appreciated by the aborigines for the sake of its nuts, together with a true kind of yam (*Dioscorea hastifolia*), the only plant on which the natives in their pristine state anywhere in Australia bestowed a crude cultivation, are with species of *Borya*, *Sowerbæa*, *Hæmodorum*, *Ricinocarpus*, *Macarthuria*, *Chloanthes*, *Aphanopetalum*, *Xylomelum*, *Caleana*, *Calectasia*, *Petrophila*, *Leschenaultia*, *Pseudanthus*, *Nematolepis*, *Nuytsia* (the terrestrial mistletoe), *Leucolæna*, *Commersonia*, *Rulingia*, *Keraudrenia*, *Mirbelia*, *Gastrolobium*, *Labichea*, *Melichrus*, *Monotaxis*, *Actinotus*, and *Stypandra*, remarkable for their geographical distribution; because, as far as we are hitherto aware, these West Australian genera have no representatives in the wide interjacent space until we approach towards the eastern, or, in a few instances, to the northern regions of Australia, *Zamia* alone having been noticed in South Australia (*Zamia Macdonnellii*), but there as an exceedingly local plant. Neither climatic nor geologic considerations explain this curious fact of phytogeography. Over some of the heathy tracts of scrub-country towards the south-west coast poisonous species of *Gastrolobium*, (*G. bilobum*, *G. oxylobioides*, *G. calycinum*, *G. callistachys*,) are dispersed. These plants have in some localities rendered the occupation of country for pastoral pursuits impossible; but these poison-plants are mostly confined to barren spots, and it is not unlikely that by repeated burnings, and by the raising of perennial fodder-plants, they could be suppressed and finally extirpated. Fortunately *Gastrolobium* occurs in no other parts of Australia, except on the inland tract from Attack Creek to the Suttor River, where flocks must be guarded against access to the scrub-patches harbouring the only tropical species (*Gastrolobium grandiflorum*). The deadly effect occasionally produced by *Lotus Australis*,—a herb with us of very wide distribution, and extending also to New Caledonia,—and the cerebral

derangements manifested by pasture animals which feed on the Darling River Pea (*Swainsonia Grayana*), need yet extensive investigation, but may find their explanation in the fact that the organic poisonous principle is only locally, under conditions yet obscure, developed, or in the probable circumstance that, like in a few other leguminous plants, the deleterious properties are strongly concentrated in the seed. The gorgeous Desert Pea (*Clianthus Dampierii*), which, in its capricious distribution, has been traced sparingly from the Lachlan River to the north-west coast, offers still to seed-collectors a lucrative gain.

A prominent aspect in the vegetation of south-west Australia emanates from the comparatively large number of singularly beautiful *Banksia* trees, preponderant there like the arboreous *Grevilleæ* in North Australia. The existence of but two of that genus, *Banksia Australis* and *B. ornata*, in the extensive tract of interior- and coast-land from the head of the Australian Bight to the vicinity of Port Philip renders the occurrence of an increased number of trees of this kind in East Australia again still more odd. Rutaceous and Goodeniaceous plants, though in no part of the Australian continent rare, attain in the south-west their greatest numerical development, and should not be passed silently, or, like *Epacrideæ*, as merely ornamental plants, though still so rare in our gardens; but these elegant plants deserve also attention for their diaphoretic properties, or for the bitter tonic principle which pervades nearly all the species of the two Orders. *Stylideæ* are here still more numerous than in our north, and comprise forms of great neatness; while Sundews (*Droseræ*) are also found to be more frequent than in any other part of Australia, and, indeed, of the globe. When, glittering in their crystalline dew, they appear as the harbingers of spring from year to year, they are greeted always anew with admiration. But the greatest charm of the vegetation consists in the hundreds of Myrtaceous bushes peculiar to the west, all full of aromatic oil; among these, again, the feather-flowered, numerous *Verticordiæ*, the crimson *Calothamni*, and the heathy *Calythrices* vie with each other as ornaments. Of this Order many gorgeous plants exist also in other, especially extra-tropical, parts of Australia. The numerous bushes of *Leguminosæ* and *Proteaceæ* in south-west Australia are also charming. The introduction of all these into European conservatories might be made the object of profitable employment. Annual herbs of extreme minuteness, belonging chiefly to *Compositæ*, *Umbelliferæ*, *Sty-*

lideæ, and *Centrolepideæ*, are here, as in other parts of extra-tropical Australia, in their aggregate more numerous than minute phanerogamic plants in any other part of the globe. A line of demarcation for including the main mass of the south-west Australian vegetation may almost be drawn from the Murchison River or Shark Bay to the western extremity of the Great Bight; because to these points penetrates the usual interior-vegetation, which thence ranges to Sturt's Creek, to the Burdekin, Darling, and Murray River, while the special south-west Australian flora ceases to exist as a whole beyond the limits indicated.

The marine flora of south-west Australia is likewise eminently prolific in specific forms, perhaps more so than that of any other shore. Many of the *Algæ* are endemic, others extend along the whole southern coast and Tasmania, where again a host of species proved peculiar; some are also extra-Australian. The whole eastern coast contrarily, and also the northern and the north-western, with the exception of a few isolated spots, such as Albany Island, contrast with the southern coast as singularly poor in *Algæ*. In a work exclusively devoted to the elucidation of the marine plants of Australia,—a work which, as an ornament of phytographic literature, stands unsurpassed, and which necessitated lengthened laborious researches of its illustrious author, the late Professor Harvey, here on the spot,—the specific limits of not less than 800 *Algæ* are fixed. Some of these are not without their particular uses. A few yield carrigeen; all, bromine and iodine. *Macrocystis pyrifera*, the great kelp, which may be seen floating in large masses outside Port Phillip Heads, attains the almost incredible length of many hundred feet, while a single plant of the leathery broad *Urvillea potatorum* constitutes a heavy load for a pack-horse.

(*To be concluded in next number.*)

ON SUBMARINE FORESTS AND OTHER REMAINS OF INDIGENOUS WOOD IN ORKNEY.

BY DR. WILLIAM TRAILL, ST. ANDREW'S.

(*Read before the Botanical Society of Edinburgh.*)

It has long been known that submarine forests exist in different parts of the English coast: there is one between Liverpool and Holyhead, where various bronze and iron articles have been from time to

time picked up, which are referred to a period prior to the Roman occupation. Several such forests have also been found in Scotland, two of which are in the county of Fife: one situated at the entrance of the Tay, and another at Largo in the Firth of Forth; and I see that at a late meeting of the Field Naturalists' Society there, specimens of wood from the submerged forest of Largo Bay were exhibited.

Geologists and other scientific men have propounded different theories to account for the existence of submarine forests. By some they have been ascribed to the agency of rivers or tides, carrying along in their eddies fallen trees and other estuary detritus, and massing them together just as sand banks or gravel banks are formed; others believe that they are occasioned by the sea encroaching upon low flat land, breaking through the coast barrier, and thus permanently engulfing the forest; some view this encroachment as a gradual process going on at the present day in certain places; others refer these phenomena to the drift or glacial period.

These theories being somewhat conflicting and unsatisfactory, I was lately induced to give the subject some attention when in Orkney, surrounded by ample materials for investigation; and although it may not be easy to account for the presence of trees in such unusual situations, there seems good reason to assign a very remote antiquity to those found in Orkney.

Our inquiry is both narrowed and simplified at the outset by the fact that (with the exception of the island of Hoy, where bushes of mountain ash, birch, and aspen poplar, are found in some sheltered nooks) no natural wood now grows in Orkney, nor is there any reliable account of trees having existed there in former times.

Barry, a modern writer, mentions a vague tradition that the harbour of Otterswick, in the island of Sanday, was once a forest, which was destroyed by an inundation; but I am inclined to think that the tradition, if such it be, has arisen from the fact that remains of trees have often been found in the bay. Any temporary inundation would, after a time, subside naturally, and leave the land exposed and dry as before, unless the level in the interior was below high-water mark; in which case, from the swampy nature of the ground, it would be a most unlikely place in which to find trees. Otterswick Harbour is a bay with a wide entrance, having a surface of five or six square miles, and a depth of water sufficient for vessels of considerable tonnage; it seems

therefore more reasonable to explain the unnatural position of these trees by assuming a general subsidence of the land, due possibly to some geological change such as we know has long been in operation, and is still observable, in the islands of the Pacific and in other places.

I do not venture to assert that these depressions of surface were the result of plutonic agency in some remote era of the past, but I confess that I see no other feasible way of accounting for them.

If we look back into history, we find that Einar, one of the first Scandinavian Earls of Orkney, who lived about the end of the ninth century, was named Torf Einar, from his having taught the inhabitants the use of peat as fuel; this would seem to indicate a scarcity of trees, if indeed any then remained, which is very doubtful. Solinus, who wrote A.D. 240, states that the Orkney islands were "only three in number, uninhabited, *destitute of woods*, partly rough with rushes, and partly covered with rocks and with sand." This statement obviously must be received with caution. Tacitus, a much earlier writer, says that these islands were subjugated by Agricola; we may therefore conclude that they were then inhabited; but on this point many different opinions have been expressed. Some suppose that, prior to the time of the Norse invasion, the islands were merely the temporary abode of pirates, while other accounts state that the aborigines were exterminated by the Norsemen. A feeble ray of light has been thrown upon this "vexed question" by the recent discovery of Maeshowe, of a building undoubtedly constructed by that ancient race. There are Runic inscriptions on its walls. Some of them referred to the ninth century, one translation of which informs us that it was a sacred edifice which had been broken into by the Scandinavians amidst the lamentations of the *wild men*. It seems probable that the natives were not actually put to death, as has been asserted, but that they gradually receded before a superior and more enterprising race, and thus eventually died out, perhaps contemporaneously with the woods and the wild animals that frequented them. Be this as it may, if we take the whole subsequent period of Scandinavian rule, from about 890 A.D. until the Scottish annexation in 1471, as narrated by the Danish historian Torfæus, we find no mention of trees. Where hunting is alluded to, otters are generally specified; and there is reason to believe that at that time they also captured seals and other marine animals. But to return to the aborigines and the forests. Where

history is uncertain, we are fortunately in possession of other silent records of the past, which enable us to affirm that at some period anterior to the Norse invasion these islands were inhabited by a rude race of men who appeared to have obtained a part of their subsistence by hunting deer and other wild animals in the forests. This is clearly proved by numerous remains of human habitations constructed of stone, found on nearly all the islands, which generally contain horns and bones of the red deer, and of a species of ox, *Bos longifrons*, along with bones of the hog and other smaller quadrupeds and birds, including the *Alca impennis*, or great auk, which has become extinct in Orkney only during the present century.

I have specimens of antlers and bones of red deer from Mr. Watt, of Skaill, which are interesting not only as relics of a fauna locally extinct, but they are also valuable as enabling us to connect the period at which these forests grew with undoubted marks of the presence of human inhabitants; or, in other words, that before the epoch of the forests and their fauna had terminated, that of the human inhabitants had commenced. The dark-coloured antlers, two of which are very large and perfect, were found in a peatmoss, which appears to have contributed to their preservation, though it has deepened their colour. The other horns and bones were taken out of some of these ancient buildings, where they are often found mixed with the bones of other animals, but those of deer are most numerous. In the largest tumulus opened by Mr. Watt, he collected nearly enough to fill three barrels. The light colour of these bones, and the crumbling condition of many of them, contrast strongly with the more perfect state of those found in peat.

It is observable that the antlers found in these old houses are generally in a fragmentary or truncated condition, the snags or points being broken off. In all probability these smaller pieces served as substitutes for skewers or forks, or were perhaps applied to a greater variety of miscellaneous uses than we, in these days of cheap cutlery, can easily imagine. I have a spur of deer's horn, found by my son last summer in the foundation-wall of a brough or round tower near Kirkwall, which has evidently been sharpened by art, and for an inch or two back from the point it is glazed or polished, as though it had been used for boring holes in skins, or for some such purpose; the thick end of it has been slightly rounded off, which would prevent it from injuring the hand, if used in the manner I have suggested.

The larger pieces of horn, from which the points or spurs are removed, appear to have been used as clubs or mallets; one piece in particular presents a glaze on its surface, suggestive of very frequent handling. A great variety of bone and stone implements of rude construction have been found in these dwellings; but they are now so diligently sought after by collectors that they are not easily procurable.

In nearly all the localities where trees are dug up—in peatmosses, in marl pits, or beneath the bed of the ocean—there also bones and horns of red deer are found, and in some places entire skeletons of deer have been discovered. Most of the principal islands of Orkney show remains of trees in their peatmosses. During last summer I visited the island of Hoy, and, on passing by a farm where extensive draining was going on, I observed that the surface of the ground on each side of the trench was literally lined with fragments of decayed trees that had been thrown out in the process of digging. In the island of Rousay, where I spent a few days in the summer of 1865, there were many traces of ancient forests, not only in the peatmosses towards the centre of the island, but also in two places on the coast much below high-water mark. I was fortunate in having a friend with a turn for antiquities, who was kind enough to accompany me in my rambles. We first turned our attention to the interior of the island, which is hilly, and much covered with peat, some of which is eight or ten feet deep. Beneath that there is generally clay or slated rock of the old red sandstone formation, with its upper stratum a good deal disintegrated. The trees, for the most part, lay deep in the peat, within a few inches of the clay or rock. Some were prostrate, but the stumps of others appeared quite undisturbed, their root fibres being traceable in all directions through the ground. Many of the smaller branches were flattened by pressure. None of the stems that we saw exceeded six or eight inches in diameter, though we were told that larger pieces are often found by the peat cutters, who dry them in summer, and add them to their winter stock of fuel. It was not easy to determine the different kinds of trees with any certainty. Birch could be distinguished by the peculiar appearance of its silvery bark; other trees had rough thick bark, not unlike Pine; that Hazel was one species is evident from the extraordinary abundance of the nuts; leaves also of different shapes are occasionally found wonderfully well preserved. Some of the sites of these trees are curious enough. There

is a freshwater lake in the island of Hoy, where trunks and branches of trees are found in abundance *under water*. I have not myself seen the place, but while exploring with my friend among the hills of Rousay, we came upon trees in a somewhat similar place, viz. in a mill-dam of two or three acres in extent, which, owing to the unusual heat of the summer, was perfectly dry, and its black surface was deeply fissured all over. On raising some of the cracked masses of peat, we found that the entire area was full of dead branches and roots of trees, and when we examined the sides of the dam or reservoir we saw many stems and branches of trees projecting horizontally from the peat. Most of them were about the thickness of a man's leg, but some were a good deal larger; they were all much decayed, and in some instances were so macerated by the water that they were reduced to a pulpy mass of fibres.

A few days after this, we resolved to examine some parts of the coast in quest of buried trees. Accordingly we visited a bay on the west side of the island at low tide, where there might be from ten to fifteen acres of sand exposed. We at once set to work, and at the first thrust of the spade we struck on a tree of considerable size, which we traced under the sand for a distance of fourteen or fifteen feet; but it was too soft to lift except in sections. This tree had coarse rugged bark, and there was lying across it a well-marked specimen of Birch. Wherever we dug into the sand, we met with peat containing trees, except where interrupted by a ledge of rocks across the mouth of the bay.

I may remark that the layer of sand covering the ligneous peat was from half a foot to a foot deep. The peat itself was about a foot thick, and lay at a depth of seven or eight feet below the ordinary high-water mark. Under the peat was a layer of blue clay.

As I have already observed, the wood, when fresh taken up, was extremely soft; sections of it made by the spade were nearly the colour of beet-root, and the clear water oozing through the sand during our operations was quickly stained with purple—a remarkable proof of the conservative power of peat that this colouring matter should be retained for such a length of time under salt water. On the following day one of our party dug up several pieces of wood with the bark on, from an open exposed part of the coast, about half a mile to the eastward of the bay. The trees in both places were found, not piled in

heaps or wave-worn like drift-wood, but firmly embedded in a stratum of peat, as though a tract of land had subsided to a lower level, carrying with it the trees and the soil in which they grew.

As I left Orkney without having an opportunity of exploring Otterswick Bay, the site of the most extensive submarine forest in Orkney, I wrote to a friend who used to live in that neighbourhood, inquiring what traces of indigenous wood he had seen there; and as his letter in reply contains interesting information, I take the liberty of quoting from it as follows:—"In the winter of 1838 there was a long-continued gale of north-east wind, which entirely cleared away the shell-sand from about fifty acres of the flat surface usually left dry at low water (our rise and fall of tide is twelve feet, and sometimes as much as fifteen feet). Going down one day at low tide, I was astonished to see, instead of the white sand, what appeared a wide stretch of black moss covered with fallen trees, lying with their roots sticking up, exactly as I saw trees afterwards in Canada laid prostrate by a hurricane. I went down to the moss, stepped from trunk to trunk of the trees, and found their substance, when cut into by a spade, quite the same as that of the moss in which they lay, just that of our blackest coal-peat. The largest of the trees seemed not more than two feet in diameter, and all were lying in the same direction, from S.W. to N.E. I secured several specimens with the bark on, but they soon dried and fell into dust. On taking to a boat, I found the same moss surface, mostly denuded of sand, showing itself under the deep clear water, with trees lying along its surface, quite across the bay to Tuftsness, four miles off, where a rupture of the peat had taken place—as all over that *ness*, under nine or ten feet of blowing shifting sand, the same peatmoss and tree remains are to be found as under the waters of the bay, although raised above high-water mark some ten or twelve feet. The rupture of the moss may be seen at most parts of the beach. In digging in the moss at Otterswick, I did not find any deer's horns or other animal remains." Here my quotation ends.

The present state of Orkney as regards arboriculture may be briefly described. The original woods, doubtless, supplied fuel to the inhabitants, and would thus slowly but surely disappear; and it is a well-known fact that a country or district entirely denuded of trees is with difficulty restored to its former condition: young plantations are best protected by other trees, and no walls or fences can adequately supply

their place. The earlier attempts at planting seem to have failed partly from the places selected for trial being too exposed, but chiefly from the trees not having been planted in sufficient numbers to shelter each other. Recent experiments in favourable situations, and where a sufficient breadth has been planted, show a more encouraging result, the trees being at present from twenty to twenty-five feet high; and, from their healthy appearance, there is every reason to expect that they will continue to increase in size.

In the town of Kirkwall and its neighbourhood, where houses afford shelter, trees readily attain a height of thirty-five and forty feet, and, by their numbers, add not a little to the picturesque appearance of the place; so much so, that not very long ago the Prince of Orange, who had been on a visit to Iceland or the Faroe Islands, and on his return touched at Kirkwall, remarked, much to the surprise and gratification of his hearers, that it was delightful to get back to *a well-wooded country* once more. The species of trees that seem to thrive best are the Sycamore or Scotch Plane, the Elm, the Ash, the Mountain Ash, and the White Poplar. Larch may succeed tolerably well in sheltered spots, but evergreen Firs and Pines in general do not appear suitable. A remarkable exception to this is the *Araucaria imbricata*, which, so far as it has yet been tried, seems likely to stand the climate, as it is there exempt from the severe frosts that are so apt to injure it in England and Scotland. Evergreen shrubs, as a rule, are grown with difficulty, and, from a strange anomaly in the climate, those kinds commonly esteemed hardy are often the most difficult to rear, and *vice versâ*. Thus, while the Laurel refuses to grow, Rhododendrons are more tractable; common Box can hardly be kept alive, yet the Box Myrtle, or *Veronica decussata*, which at Edinburgh is treated as a greenhouse plant, grows out-of-doors there in great luxuriance, retaining its vivid green throughout the winter, and in spring producing a profusion of fragrant white blossoms. This beautiful shrub, which in Orkney grows to the height of five or six feet, is a native of the Falkland Islands and the extreme south of South America, and there is little doubt that other plants from that locality might be introduced into these islands with a fair chance of success.

The remarkable mildness of winter in so high a latitude as 59° north is chiefly attributable to the influence of the Gulf Stream, which perceptibly raises the temperature of the sea, and frequently casts upon

these northern shores, palm-leaves, pieces of bamboo, masses of caoutchouc or gum elastic, and seeds of various tropical plants, as *Stizolobium urens*, *Mimosa scandens*, etc.

CORRESPONDENCE.

Petasites albus, Gärtn.

During a recent examination, at the British Museum, of a herbarium collected by me at Aberdeen, in boyhood and early youth, a specimen labelled "*Petasites vulgaris*, found near Woodhill, 15th April, 1841," has proved not to be that species, but the partially naturalized *Petasites albus*, Gärtn., figured by Mr. J. T. Boswell Syme, F.L.S., in his edition of the 'English Botany,' vol. v. plate 782. Having written on the subject to my friend Professor Dickie, he was kind enough to visit Woodhill, which he states to be a small property about two miles north-west from Aberdeen. On examination, he found there, opposite to a gate, an irregular heap of rubbish, evidently cast out at various times from the garden; and, growing on it, *Petasites albus*, *Ægopodium*, etc. The plant, therefore, is not indigenous in that locality: but yet Woodhill must be added to the two stations near Aberdeen, mentioned by Mr. Syme as places where the *Petasites albus* is becoming partially naturalized; and the interest attaching to the Woodhill habitat is the evidence now afforded that, though the plant is limited to a very circumscribed area, it has still apparently succeeded in maintaining itself there for upwards of a quarter of a century.

Robt. Hunter.

London, 23*rd May*, 1867.

NEW PUBLICATIONS.

Description de la Flore fossile du Premier Étage du Terrain Crétacé du Hainaut. Par Eugène Coemans. (From the Mémoires de l'Académie Royale de Belgique, vol. xxxvi.)

M. Coemans has in this memoir described a very curious flora, the species of which have as yet been found only in the one locality. The precise age of the deposit in which they occur is uncertain. It rests upon carboniferous rocks. And although MM. Cornet and Briart, who have examined the stratigraphical structure of the district, state that, like most other geologists who have studied the country, they

had *à priori* considered the beds as belonging to the cretaceous formation, yet they have been unable to obtain any proof that they belong more to that formation than to any other posterior to the carboniferous period. And the palæontological evidence does not give much assistance. The vegetable remains occur in plastic clays (below beds equivalent to the Gault), and were found during excavations in the hamlet of Baume, near La Louvière; they consist of numerous true coniferous cones, generally very well preserved; pieces of resin; and masses containing coniferous wood, cycadean fronds, scales of cones, and fragments of acicular and trigonal leaves belonging to the genus *Pinus*.

The cones belong to eight species of *Pinus*. It has not been possible to refer the specimens of wood to the different species founded on the characters of the cones.

The flora of La Louvière, as at present determined, probably represents the vegetation of a mountainous country, being composed almost exclusively of conifers; however, further explorations among the cretaceous strata of Hainaut may modify this very exceptional facies of its vegetation.

The flora of La Louvière presents the remarkable peculiarity of possessing but few species in common with any of the cretaceous floras at present known. England, Saxony, Silesia, Moravia, have yielded cretaceous conifers, but they bear little or no relation to the Belgian species. The Belgian *Pinus Corneti* approaches however to the *Abies oblonga*, Lind., of the Greensand of England, and the *Pinus Andræi* has some affinity to the *Pinus Quenstedti*, Heer, of the cretaceous rocks of Moravia. Although the different cretaceous floras of Europe possess but few identical species, they all offer a more or less Indo-Australian character, except this singular flora in Belgium. In the Indo-Australian zone *Araucaria*, *Podocarpus*, *Frenela*, *Phyllocladus*, and *Gnetum* predominate, but none of them have been met with in this flora.

The fossil flora of Hainaut has yielded several intermediate forms which serve as connecting links, and which have led the author to retain in its entirety the genus *Pinus* as Linnæus established it. Thus it is seen, by the descriptions of the species, that *Pinus Corneti* unites *Abies* to *Cedrus*; *Pinus Andräi*, *Strobus* to *Pinaster*; and *Pinus Heeri*, *P. depressa*, and *P. Toillezi* are transition forms between *Cembra* and *Strobus*.

The following is a list of the species described, which are fully illustrated in the three plates that accompany the memoir :—*Cycadites Schachti*; *Pinus Omalii*, *P. Briarti*, *P. (Cedrus) Corneti*, *P. Andræi*, *P. gibbosa*, *P. Heeri*, *P. depressa*, *P. Toillezi*.

To complete his work the author has appended lists of all the Cycads and Conifers that have been discovered in the cretaceous rocks of Europe. The American rocks of the same period have not yet yielded remains of either of these orders.

Manual of British Botany. By C. C. BABINGTON, M.A., etc. Sixth Edition. London: Van Voorst. 1867.

It is a satisfactory evidence of the healthy condition of British botany that this Manual, which specially meets the wants of the critical students of our flora, runs into a new edition at the outside every five years,—especially when it is remembered that two other standard floras are in the market, each with its own school of sturdy supporters. We are specially interested in the interval that has passed since the publication of the last edition of this work, as this Journal has, during the greater portion of that time, been the chief, indeed the only, medium of intercommunication among British botanists. We have frequently had the pleasure of introducing to our readers interesting novelties which had hitherto escaped observation, accompanied with characteristic drawings from the pencil of Mr. Fitch. With the exception of one species (*Pyrus rupicola*, Syme), all the *bonâ fide* additions to the flora have appeared in our pages, with descriptions by Babington, H. C. Watson, Moore, Baker, etc. The following is a list of these species :—

Ranunculus pseudo-fluitans, *Newb.*
R. reptans, *L.*
Viola arenaria, *De Cand.*
Sagina nivalis, *Fries.*
Hypericum undulatum, *Schousb.*
Ulex Gallii, *Planch.*
Pyrus rupicola, *Syme.*
Inula salicina, *L.*
Mentha alopecuroides, *Hull.*
Utricularia neglecta, *Lehm.*
Neotinea intacta, *Rchb.*
Lemna arrhiza, *L.*
Potamogeton nitens, *Web.*
P. decipiens, *Nolte.*
Chara alopecuroides, *Del.*

Professor Babington does not yet fully admit *Hutchinsia alpina*, R. Br., and *Aira uliginosa*, Weihe.

Of foreign plants that have been introduced into Britain, the following are given in the 'Manual' as certainly naturalized :—

Melilotus parviflora, *Desf.*
Trifolium hybridum, *L.*
Œnothera odorata, *Jacq.*
Claytonia perfoliata, *Donn.*
Galinsoga parviflora, *Cav.*

Erucastrum Pollichii, Schimp., and *Erinus alpinus*, L., at least for the present, are kept as aliens not really naturalized.

Besides the changes in the nomenclature of the genus *Arctium*, in accordance with Professor Babington's published opinions, we find our *Muscari* determined to be *M. neglectum*, Guss., and we part with regret from the familiar name of our pet grass, *Knappia agrostidea*, Sm., and substitute for it, by the inexorable law of priority, the perhaps somewhat more euphonious name of *Mibora minima*, Guss.

Everywhere throughout the 'Manual' there is evidence that Professor Babington continues to be an active critical botanist. Too often the comforts and duties of a university chair divert its occupier from those labours which were the stepping-stones to the honourable position. No indications of carelessness or oversight can be detected in this edition, but it is obvious that the most exact attention has been given both to what is added and to what is omitted. Many of the emendations that are introduced into this edition will escape the observation of those who do not institute a verbal comparison between it and the last. It is interesting to notice how the text becomes more and more exact in each successive edition.

BOTANICAL NEWS.

Dr. Seemann has just returned from his recent tour to Nicaragua, and brings with him a complete set of the plants of the Chontales gold region.

Professor Unger's "Sunken Island of Atlantis" has been translated from our Journal into Spanish by Mr. A. Ernst, and published as a pamphlet in the city of Caracas, Venezuela.

Schlechtendal's journal, the 'Linnæa,' will be continued by Dr. Garcke, of Berlin.

Our readers will be glad to learn that the eminent services rendered by the Rev. M. J. Berkeley to science, and especially to botany, as applied to horticulture and agriculture, have been recognized by the present Government, placing him on the Civil List pensions for an annuity of £100.

Henry Trimen, M.B. (Lond.), F.L.S., has been appointed Lecturer on Botany at the Medical School attached to St. Mary's Hospital, Paddington.

We have just received the fifth volume of Dr. Ferd. Mueller's 'Fragmenta Phytographiæ Australiæ.'

Mr. C. D. Larbalestier has just published the first Fasciculus of the Lichens of Jersey and Sark, containing fifty species, among which are some new to Britain, such as *Bæomyces carneus*, Flörke; *Lithographa petræa*, D. R.; *Opegrapha vulgata*, var. *steriza*, Ach.; *Opegrapha lithyrga*, Ach.; two new to science, *Verrucaria Whichcotii*, Larbal., and *Lecidia diducens*, Nyl.; and several that are rare and little known, as *Lecidea carneo-lutea*, Turn., *Sticta aurata*, Sm., etc. We may hope that many more interesting and novel species will reward Mr. Larbalestier's researches in a locality where comparatively little has been done with this order of plants. The price of each fascicle, including the postage in Britain, is 12*s*. 6*d*. The author's address is "Roche Vue, St. Aubin's, Jersey."

M. Reverchon, of Briançon, Hautes Alpes, France, informs us that he intends distributing plants collected by him in the Alps of Dauphiny, Savoy, and Piedmont, at the price of 10 francs per century. Those wishing to obtain sets must communicate with him, addressing letters to "*poste restante*, Briançon."

Dr. J. J. Bigsby, in the account of his 'Thesaurus Siluricus' submitted lately to the Royal Society, stated that 76 species of plants have been found in Silurian strata. Of these, 16 species are from the lower division of Barrande's Primordial Stage, 6 from the upper division, and the remainder from the Silurian period proper.

The Botanical Society of France have sent out invitations for a Congress to be held at Paris, from the 16th to the 23rd of August, 1867, when it is expected that the International Exhibition will induce botanists to come to Paris from foreign countries, as well as from the provinces of France itself. The objects of the Congress are the reading of papers on pure or applied botany, and discussions upon them; and the Society are especially desirous of introducing such subjects of importance as the influence of the sun on the distribution of the species of plants, and the necessity of establishing a botanical code to decide difficult questions as to synonymy and priority. The meetings of the Congress will be held at the Society's house, 84, Rue de Grenelle Saint-Germain, in one of the halls belonging to the Imperial Horticultural Society, to be lent for this purpose. The first meeting will be held at eight o'clock in the evening of the 16th of August, when the Committee will be elected. In the intervals between the meetings of the Congress, some of the members of the Society will give advice to foreigners and accompany them to scientific collections and establishments in Paris. Notice of papers or inquiries should be addressed to Ed. Bureau, who is acting as Secretary to the Congress Committee, at 84, Rue de Grenelle Saint-Germain, Paris.

MIOCENE FLORA OF GREENLAND.—At the meeting of the Geological Society of London, held May 8, 1867, eight slabs from the Miocene deposits of Atanakerdluk in Greenland, lat. 70° N., were exhibited by R. H. Scott, Esq. They contained numerous leaves which had been determined as follows, by Professor Heer:—(1) Exhibiting *Populus arctica*, Heer; *Paliurus Colombi*, Heer; *Hedera M'Clurii*, Heer; *M'Clintockia Lyellii*, Heer; *Quercus Dug-*

meia, Ung. (*fructus*); and *Sequoia Langsdorfii*, Br. (2) *Fagus Deucalionis*, Ung.; *Populus arctica*, Heer; *Prunus Scottii*, Heer; *Quercus Grœnlandica*, Heer; *Corylus Macquarrii*, Forbes (*Alnus*); *Sequoia Langsdorfii*, Br.; *S. Couttsiæ*, Heer; *Pinus hyperborea*, Heer; *Diospyros brachysepala*, Br.; *Andromeda protogæa*, Ung.; and *Hedera M'Clurii*, Heer. (3) *Andromeda protogæa*, Ung.; *Sphæria arctica*, Heer; *Quercus Olafseni*; *Fagus Deucalionis*, Ung.; *Carpolithes sphærula*, Heer; *Sequoia Langsdorfii* (with seeds); and *Equisetum*, sp. (4) *Daphnogene Kanii*, Heer; *Diospyros brachysepala*, A. Br.; *Corylus M'Quarrii*, Heer; *Sequoia Langsdorfii*, Br.; and *Phyllites membranaceus*, Heer. (5) *Populus arctica*, Heer, var.; *Populus Richardsoni*, Heer; *Sequoia Langsdorfii*, Br.; and *M'Clintockia trinervis*, Heer. (6) *Sequoia Langsdorfii*, Br. (*amentum masculum*). (7) *M'Clintockia dentata*, Heer. (8) *M'Clintockia trinervis*, Heer.

BOTANICAL SOCIETY OF EDINBURGH. — *Thursday, 9th May.* — William Gorrie, Esq., Vice-President, in the chair. Professor Balfour noticed the death of John Gray, Esq., who had been for many years a member of the Society. He died at Braeside, Helensburgh, on 28th April last, in the seventieth year of his age. The following communications were read:—1. On Submarine Forests and other remains of Indigenous Wood in Orkney. By Dr. William Traill, St. Andrew's. 2. On the Lichen Flora of the Druidical Stones of Scotland. By Dr. W. Lauder Lindsay. In this paper Dr. Lindsay gave a short historical account of the probable age, origin, and uses of what are commonly called "Druidical stones," or "stannin' stanes," met with in various parts of Scotland. During the summer of last year he had made an excursion to Lewis and Orkney, for the purpose of examining the lichens found on these peculiar stones in these islands. He specially examined those of Callernish and Stennis. He concluded by giving a list of the different genera and species found. 3. Botanical Intelligence. By Professor Balfour. Dr. Balfour communicated a report from Dr. Cleghorn on the progress of the forests in Bengal during 1865–66; also a report from Dr. Thomas Anderson on the introduction of the Mahogany-tree into Bengal. It was originally introduced from the West Indies in 1795 into the Botanic Garden at Calcutta, from which time its growth had been very satisfactory. In 1864 there were sixty-nine trees of large size growing in the garden, besides numerous small ones, averaging upwards of one foot in diameter. Many of the former were blown down by the cyclone of 1864, and when they were examined the roots of the majority of them were found to be more or less decayed, owing, in all probability, to the richness and dampness of the alluvial soil in which they were planted. The dimensions of the largest tree now in the garden are as follow:—

	Ft.	In.
Circumference at 4 feet above ground	14	3½
" 5 "	14	2
" 6 "	14	2
Length of bole	13	0
Extreme height of tree	150	0
Spread of branches	102	0

And the following are the dimensions of a log at present lying in the gardens, cut from one of the trees blown down in the cyclone:—

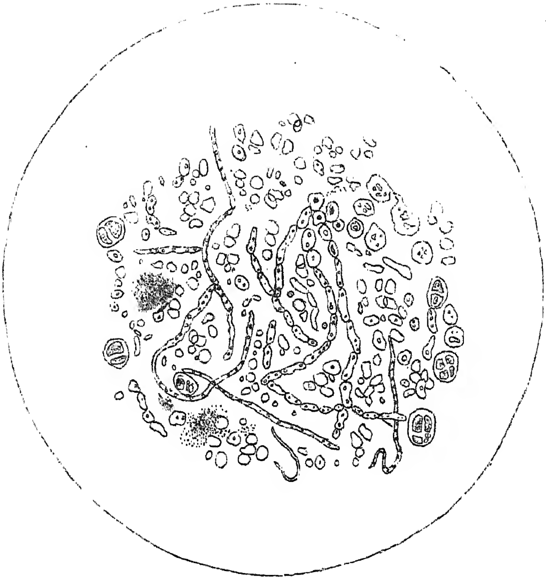
	Ft.	In.
Length	13	9
Mean breadth	0	51
Mean depth	0	34
Cubic contents	169	2

To contrast with the above the following are the measurements of the largest log cut in the Honduras up to the year 1830:—

	Ft.	In.
Length	17	0
Breadth	0	57
Depth	0	64
Cubic contents	430	8

4. Notice of some rare British Mosses recently collected near Edinburgh. By Mr. John Sadler. The author gave an account of a muscological excursion which he had recently made in company with Dr. White, Mr. Charles Howie, and Mr. J. Brown, to the Queen's Park, Duddingston, and Craiglockhart, and recorded the rarer species met with. They included *Tortula aloides*, *T. intermedia* (new to the Edinburgh flora), *Grimmia subsquarrosa* (new to the Edinburgh flora), *G. orbicularis* var. *oblonga*, *G. leucophea*, *Schistidium confertum*, and *Orthotrichum anomalum* (*verum*), in the Queen's Park; *Orthotrichum diaphanum*, *Pottia cavifolia*, *P. gracilis*, and *Tortula rigida*, on walls at Duddingston; and *Tortula Mullerii*, *T. intermedia*, *T. papillosa*, *T. rigida*, *T. revoluta*, *Hypnum piliferum* var., *Pottia cavifolia*, and *Dicranum scoparium* var. *curvatum*, at Craiglockhart. The paper was illustrated by specimens of the different species and varieties referred to. 5. Notes of an Excursion to the Forest of Fontainebleau. By Mr. George W. R. Hay. In the beginning of last month (April, 1867) the author accompanied a party of Parisian botanists in a botanical excursion in the Forest of Fontainebleau. The party left Paris in the evening, and proceeded to a large cave in the centre of the forest, where they remained for the night. Next day they botanized the surrounding neighbourhood and returned to Paris. The author was fortunate in collecting *Hymenophyllum Tunbridgense* in a a deep cleft. This Fern had not been previously met with in that part of France, it being confined in that country to the extreme north-west, as at Brest and near Cherbourg. The party also collected *Asplenium lanceolatum*, which is only found in one place within forty leagues of Paris. The author concluded by giving a list of the plants collected during the excursion. 6. Miscellaneous Communications. (1) Mr. A. Craig Christie exhibited a model of an apparatus for pressing plants, which was so constructed as to form a sort of box for holding drying-paper during travelling, and capable of being afterwards converted into a series of boards for pressing plants. (2) Mr. M'Nab laid before the meeting a tuft of the Californian Bunch Grass, raised from seed sent home during 1865, by Mr. Robert Brown, the collector to the British Columbia Botanical Association. This grass was planted out during the spring of 1866; it now averages three feet nine inches in height, surpassing from the beginning of the season all other grasses in cultivation. While this grass is tender, it will prove a great acquisition for spring feeding. It is perfectly hardy, and suitable for any climate. Owing to the tendency to form large compact hassocks, it should be grown alone. It seeds freely, and is easily increased by division of the roots.

Tab. 67.



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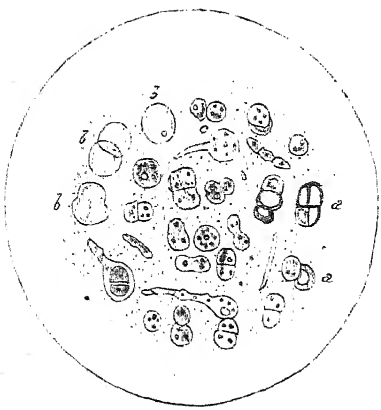

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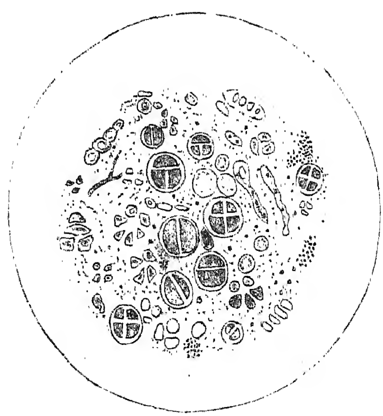


1. 300×

Beigel del, E Smith, lith.

ON THE SO-CALLED CHIGNON FUNGUS (*PLEUROCOCCUS BEIGELI*, *Rabenh. et Küchenm.*).

By H. Beigel, M.D., M.R.C.P.

(Plate LXVII.)

In the beginning of this year some of the workmen employed by Messrs. Hovenden, of City Road, London, found some peculiarity in certain foreign human hair, never before observed by them. This hair "had been cleaned and prepared in the usual manner, but after these processes it did not present the smooth and glossy appearance which the cleaned hair ought to display; it was therefore rejected, and given back to the employers as being, from some cause or other unknown to the workmen, unfit for sale."* Messrs. Hovenden showed locks of this rejected hair to several men of science, myself amongst the number. The subject of parasitism on false hair was then—February—undergoing public discussion in our newspapers; an article in the Hamburg 'Freischütz,' founded on Lindemann's treatise on 'Gregarinæ,' having made its way into England, and being largely, and loosely, commented upon. I set about investigating the matter, and became soon convinced that the parasite was not of animal but vegetable nature, and, without loss of time, I communicated my discovery to some of the most eminent Cryptogamists on the Continent,—amongst them, Dr. Cohn, of Breslau, and Dr. Rabenhorst, of Dresden, and more particularly Dr. Küchenmeister, of Dresden, whose valuable work on the parasites of the human body seemed to single him out as the one more specially calculated to pronounce an opinion. The following is Dr. Küchenmeister's reply to my first communication:—

"*Dresden, March* 10, 1867.

"Many thanks for the new Alga, *Pleurococcus Beigeli*, which you kindly sent me. I received your letter on the 9th inst., and went at once with it to Dr. Rabenhorst, our greatest Algologist, asking him to examine your parasite with me. We soon convinced ourselves of the correctness of the drawing you sent.

"The Alga must bear the generic name of *Pleurococcus*, Meneghini. Kützing, who, in his work on Algæ, figures the genus on the very first plates of the first volume, designates the genus under the erroneous name of *Protococcus*, Agardh. Rabenhorst insists, and justly, on the right of priority of

* 'Hairdressers' Chronicle,' June 1, 1867. Article, "Chignon Fungus."

the first name, which is also the most appropriate, the Alga looking like a Maltese cross, the arms of which are pushed together.

"The occurrence of the plant on false hair is, Dr. Rabenhorst thinks, easily explained by the hair being treated with water mixed with honey, etc. Dr. Rabenhorst holds the species to be new, and has asked me to suggest a name, which I have done by calling it *Pleurococcus Beigeli*, in the hope that it will meet with your approval. If you should have any doubt about the newness of the species, please to refer to Mr. Archer, of Dublin, the best British Algologist. If he should know the plant already, our name must be suppressed, otherwise it will stand.

"Yours, etc.,

"*Dr. Beigel, M.R.C.P.* "F. KÜCHENMEISTER."

On the 17th of March, Dr. Küchenmeister addressed a letter to the Vienna 'Zeitschrift für Practische Heilkunde,' which that paper published in its issue of the 22nd of the same month, and of which the following are the salient points:—

"In one of your last numbers you speak of certain parasites which Prof. Lindemann has discovered in the Chignons. Allow me to tell you what I know about the matter. On the 8th of March of this year, Dr. Beigel, of London, sent me a few Chignon hairs, in different parts of which (not on the point only, as in Lindemann's statement) the naked eye could perceive one, or sometimes two, minute points or knots, varying in size. These knots Dr. Beigel found to be a new microscopic plant, which he asked me to determine. Feeling that I was not quite capable of handling the subject as it ought to be handled, I invited our esteemed Dr. Rabenhorst to assist me in examining the plant. Selecting the largest visible knot, we found an organism which (corresponding with Dr. Beigel's drawing) completely agreed with that of *Pleurococcus*, Meneghini. The *Pleurococceæ* differ from the *Protococceæ*, Agardh, in the single cells undergoing a quaternary division, and the lines of division run in different directions, whilst in the *Protococceæ* the division of the cells is binary, or one might describe it as an accumulation of granules in the cells. Kützing has confounded the two. The species occurring on Chignon hair appeared new to us, and we named it, after its discoverer, *Pleurococcus Beigeli*. With the exception of colour, which our species has not, one finds analogous forms figured in Kützing's 'Tabulæ Phycologicæ,' i. plate 3 (*Protococcus viridis*, *glomeratus*, *communis*, α et β) and plate 4 (*P. membraninus*, *dimidiatus*, *thermalis*, and *minutus*).

"A few days later, I saw much smaller points on the Chignon hair, and met with a parasite which differed considerably in structure from the above-named; and this discovery was confirmed by Dr. Rabenhorst. The parasite grew ray-like, from a gelatinous protoplasm; sometimes it would seem as if threads penetrated into the body of the hair; and if this should be confirmed, the plant would certainly be closely related to the Fungi. The whole exhibited a faint colour like that brought about by chrome or iodine, inducing Dr. Rabenhorst to ask me whether I had dyed the hair with iodine (which, however, had not

been done). Whether the Chignon hair had been dyed in any way, and the colour had thus been imparted to the plant, I cannot say. We can only add, that this parasite did not have the quaternary division; and we only saw a ternary one, at the time of examination. This second form of parasitism resembled, both in form and in the colouring imparted by phyto-chromatic pigment, the *Protococcus cinnamomeus*, Kütz. Tab. Phyc. i. tab. 5, or perhaps more the still earlier stages of development of *P. gloocarpa*, especially that figured on plate 22 of the first volume.

"It remains to be seen whether we shall succeed in developing this parasite, by which alone an exact determination becomes possible. With the alternating generation of the lower types of the vegetable kingdom before us, the question is, whether we have not here a mere, perhaps intercurrent, perhaps even multiple, stage of development of a parasite belonging to a very different Natural Order of plants; or whether not all, or at all events many *Palmelleæ*, like the *Cysticerceæ*, are lower stages of development of other known plants.

"We medical men are chiefly interested in the question, Are these vegetable parasites injurious to the human head? The question can be solved only by experiment. Dr. Rabenhorst informs me that on the hair of a mammal, preserved at the Halle Museum, a parasite similar to that of the Chignon has been detected. But this does not solve the question, whether the parasite would also grow on the living hair of man and beast. The parasite at the Halle Museum may have developed on the dead skin, and we must watch and see whether our parasite, the growth of which is stimulated by moist atmosphere created by the wetting of the hair with hair-wash (honey and water, etc.), and the warmth of the head, will translate itself from the false to the living hair. At present we must regard it as a Saprophyte, *i.e.* a parasite vegetating on dead matter, and distinguished from a Zoophyte, *i.e.* a parasite vegetating on living substances, to which, of course, the hair of living human beings belongs. But it should be borne in mind that there are parasites which exist in both ways,—for instance, *Botrytis Bassiana*, the fungus of the silkworm; and it does not follow that the Chignon plant which to-day we must regard as a Saprophyte may not one day appear as a fast-growing Zoophyte."

Amongst those to whom Messrs. Hovenden had shown the hair rejected by their workmen, was Dr. Tilbury Fox. On the last Wednesday in February I called on that gentleman, and freely communicated to him what I had discovered, viz. that the parasite was not of animal but of vegetable nature. On the 2nd of March there appeared in the 'Lancet,' p. 292, the following letter:—

"Sir,—I beg to send you some specimens of a fungus I have found in large quantity on and in connexion with change of structure in false hair, with which I have been acquainted for some time. I should think it is the same as the *Zoogloea capillorum* described a few years ago by Dr. Aloys Martin. It belongs to the Tinea class of fungi.

"Yours obediently,

"*Sackville Street, February 27th*, 1867. "TILBURY FOX."

A letter of mine appeared in the subsequent week of the 'Lancet' (March 9, 1867), p. 320, and runs as follows :—

"Sir,—I have recently observed a peculiar condition of hair produced by a fungus, which, as far as I can learn, is new. The hair is distinguished by a number of knots, each forming a sheath round the shaft. On examination under the microscope, each knot is seen to consist of a peculiar kind of fungus. The spores are large, and very regularly, almost mathematically, divided into two, three, four, and more sections, having great resemblance to *Sarcina*, but differing from that in many respects. By boiling such a knot or vegetable mass in alkaline water, the appearance under the microscope changes, and beautiful ramifications of threads and chains are to be seen.

"As soon as my observations on germination, etc., of the fungi shall be concluded, I shall be glad to publish the same.

"In conclusion, I may be permitted to mention that I have obtained the sample of hair from the warehouse of Messrs. Hovenden, where it was picked out by a workman from a great many different 'heads' as perfectly unfit for being cleaned. In all other hairs which have been submitted to me for examination, no traces of animal or vegetable life could be detected.

"Yours truly,

"*Finsbury Square, March*, 1867. H. BEIGEL, M.D., ETC.

"*** This is probably the fungus referred to in our last impression as the *Zooglœa capillorum.*—Editor of 'Lancet.'"

The editorial foot-note appended to my communication necessitated the following additional letter to the 'Lancet' (March 16, p. 352) :—

"Sir,—You appended to my letter in the last number of your esteemed journal, concerning a new fungus of the hair, a note, in which you point to the probability that the fungus described by me may be the *Zooglœa capillorum.* If you would have the kindness to read the description or to glance at the drawing of *Zooglœa capillorum* given by Dr. Aloys Martin in Henle and Pfeuffer's 'Zeitschrift für Rationelle Medicin," vol. xiv. p. 357, or peruse the extract given therefrom in vol. xxxi. of the 'British and Foreign Medico-Chirurgical Transactions,' you would, I think, be convinced that *Zooglœa* has not the slightest resemblance to the fungus discovered by me. To name only one difference—of which there exist a great many—of the two growths. The spores of *Zooglœa* appear under a magnifying power of 300 to 480 as small points, as if intermingled with nuclear grains; while the spores of my fungus, under the same magnifying power, seem as large as a lentil and even a pea. Besides, my fungus does not destroy the hair, which remains perfectly firm at the affected spot. This point is of importance, for it would have distinguished at once my fungus from that which Dr. Tilbury Fox mentions in 'The Lancet' of the 2nd inst.; but he himself believes the fungus seen by him to be identical with the *Zooglœa capillorum.*

"It may be stated, in conclusion, that my fungus has been for the last week actively germinating on my arm, which was blistered before the vegetable had

been attached to it; yet, up to the present date, no affection of the skin whatever has been produced by it. I hope soon to be in a position to place before you a full description and illustration of my fungus, which is one of the most interesting and beautiful hitherto observed.

"I remain, Sir, yours faithfully,

"*Finsbury Square, March*, 1867. "H. Beigel, M.D., etc."

On the 5th, and again on the 19th of March, I brought the subject before the Pathological Society. A report of what took place at the last meeting I quote *verbatim* from the 'Medical Times' of March 30, 1867, p. 347, the 'Lancet' having omitted it. It runs thus:—

"Dr. H. Beigel exhibited specimens and drawings of a microscopic plant found on human hair. It appeared in knots round the hair, which could not readily be removed. Specimens had been examined by Küchenmeister, who pronounced it an alga belonging to the genus *Pleurococcus*, but of a new species, which he proposed to name after the discoverer.

"Dr. Tilbury Fox said they were only *Gregarines*, of which he knew some time ago, and of which he now had specimens germinating in a saccharine solution. He proposed to bring them before the Society at a future period."

In the May number of 'Hardwicke's Science Gossip,' Dr. Tilbury Fox publishes a paper on the "Chignon Fungus," which is interesting in so far as it shows Dr. Fox's development of knowledge on the subject, *pari passu* with the development of the plant as shown by me at the Pathological Society. My preparations were there first exhibited on the 5th of March, when Dr. Fox inspected them carefully and found them "very remarkable." But for want of time I had to postpone those demonstrations, which took place on the meeting of the 19th March. Here Dr. Fox publicly declared that he had seen my preparations; that they were doubtlessly *Gregarines*, and that at a future meeting he would place his own preparations before the society in order to convince the members that he was right. But to my very great surprise I find that Dr. Fox, instead of placing his researches before a professional body, has preferred addressing himself to the general public, and at the same time adopting my more correct views on the subject. He says, "I have never seen a true gregarina in connection with the hair, but I have recently found a vegetable growth on false German hair, answering in naked-eye appearances to that described by Lindemann as little dark specks surrounding the hair towards its end."

It is not without interest to see the truth so strongly impressed

on Dr. Fox's mind that in the excitement he thought it was himself who discovered the vegetable growth, and that he has forgotten altogether what he has seen and said at the two meetings of the Pathological Society.

Dr. Fox's paper, "The Chignon Fungus," is, in its greater part, a reproduction of what has been said by Lindemann and a daily Hamburg paper, while a comparatively small portion contains some microscopic researches illustrated by thirteen woodcuts. This portion is a most unfortunate one, for Dr. Fox not only drew everything that came within the reach of his objective, but described it also as a stage of development of the Fungus. Thus we find four or five different *Algæ*, and three *Infusoria* (*Psorocentrum micans*, *Monas termo*, and *Actynophrys Sol*). In fact, amongst the twenty odd objects of the paper I find only six belonging to the plant in question, while all the rest were admixtures of the saccharine solution in which the growth of the plant took place. But even the former few are incorrectly drawn or misinterpreted. Fig. 75, for instance, is by no means the knob on the hair as seen under the microscope, but it represents rather one already damaged by pressure. The appearance of the knob is perfectly regular, and—as may be seen even with the naked eye—bulbiform. Fig. 78 is not a large cell, "undergoing division very actively," but a number of cells imbedded in their original stratum. Had Dr. Fox been less anxious to address the public, and studied more the division, development, and growth of the cells, he would doubtless not have fallen into such error.

EXPLANATION OF PLATE XVII. (Referring to *Pleurococcus Beigeli*.)

Fig. 1. The contents of a knob just taken from the hair and viewed by the microscope, principally consisting of sporules of *Pleurococcus Beigeli*, each containing two or four, exceptionally three large nuclei, remnants of mycelium and protoplasma. 2. Another knob, after vegetating twenty-four hours in a saccharine solution, the nuclei converted into small, highly refractory dots, some cells (*a a*) broken and the nuclei escaped therefrom, others (*b b b*) being much inflated, others again (*c*) having differently-shaped projections. 3. Mycelium, after five or six days' vegetation. There are differently-shaped cells visible, and representing different stages of intermediate development. But there appear again the original sporules containing their large nuclei. 4. Natural size of globular development of mycelium on a hair in a saccharine solution after several weeks' vegetation.

WEEDS AND THEIR CHARACTERISTICS.

By Berthold Seemann, Ph.D., F.L.S.

So great are the changes constantly going on in the nature and aspect of the vegetation of the inhabited globe, that it is almost as difficult to conjure up by pen or pencil the flora of a country as it was a few centuries ago, as it would be that of any former geological period. By not taking these changes into account, those who endeavour to give us vivid pictures of the past,—historians, historical painters and romance writers,—often fall into the error of using, as a background for ancient historical events, the country in which they happened in its modern aspect, an anachronism as painful to a botanist as a wrong note is to a musical ear. In a well-known print, representing Joseph sold by his brethren, the artist has carefully represented the Date-Palm and other features of the desert, but he has committed the blunder of introducing the American Cactus, which did not reach Syria till several thousand years after Joseph's death. Some time ago, I saw a play founded upon an incident of early Roman history. The stage accessories had been executed with pre-Rafaelitic accuracy. There was the Roman landscape in all its beauty; the melancholy Cypress, and the Stone Pine of Italy, the outline of which Pliny so happily compares with the smoke of Vesuvius as it hovered over the crater 1800 years ago, and still hovers in our year of grace; but there was also, unfortunately, the American Aloe (*Agave*), which at present forms such a prominent feature of many a South European landscape, but was confined to the New World before the days of Columbus.

Amongst plants a fierce though silent struggle for the possession of the soil is constantly going on. Even when no foreign elements are introduced into the flora of a country, it is ever at work; but it becomes much more fierce when species from abroad appear on the field, or, at all events, from our being able to recognize at a glance the opposing elements, we are in a better position to watch the struggle and its issue. A prominent example of such a battle-field, if so martial a term be admissible, is the island of St. Helena, where the native vegetation is almost entirely superseded by a foreign one, some of the singular indigenous tree-*Compositæ* and others now existing in only one or two old specimens. In some parts of the Cape of Good Hope an equally great change is noted, and many species are in danger

of becoming altogether extinct. I remember the venerable explorers, Ecklon and Zeyher, taking me to see a few Silver-trees (*Leucadendron argenteum*), which, they assured me, were the only specimens in South Africa. Dr. Hooker, in his suggestive paper "On the Struggle for Existence amongst Plants" ('Popular Science Review,' April 1867), has well pointed out the rapid spread of European species in New Zealand, and the displacement of the indigenous. The alterations wrought in Europe by the naturalization of foreign plants are familiar to us all, and many other parts of the inhabited globe might be pointed out where the same phenomenon is observable. Foreign plants deport themselves towards the indigenous as an invading army does towards the inhabitants of a hostile country. Before the bulk of the army advances, outposts make their appearance, consisting of the most daring and hardy fellows. In the vegetable kingdom this office is performed by the *weeds*, and it is on them that I should like to make a few remarks.*

Considering that weeds are found in every part of the inhabited world, it is singular that so few languages have a full equivalent of the term "*weed*," and that so useful an idea as that popularly embodied in it should not have been, long ere this, translated into science. The Latin "*herba*," or Spanish "*yierba*," certainly does include our "weed;" but whilst every weed is a herb, not every herb is a weed. What, then, is the real meaning of "weed"? Dictionary writers do not help us much by qualifying weed as a mean or troublesome herb, for the popular mind associates with the nature of a weed several other characteristics not mentioned by them. We talk of plants bearing "a weedy look," and though most of us know what that means, nobody has as yet made it clear to those who do not know. The term weedy would be misapplied to the Aloes, but fit exactly the generality of the *Alsineæ*. We would never say of the Heather that it had a weedy look; in fact, the term would never suggest itself in connection with that species. The vegetation of New Holland could not be described,

* I may here state that this article was written on the Atlantic after reading a paper of Dr. Hooker's, "On the Struggle for Existence among Plants," in the 'Popular Science Review' for April, 1867, which I found on board the Royal Mail Steamer 'Douro,' in the Virgin Islands, West Indies. Some of the views advanced here are, as it were, a further development of ideas touched upon by Dr. Hooker.

speaking generally, as bearing a weedy look, whilst that of the lower coast region of most tropical countries could scarcely be better defined than by that phrase. One of the most essential characteristics of a weed is, therefore, that it should look weedy, or, in other words, that its stem and foliage should be neither too fleshy nor too leathery, but of a soft, flaccid, or membranaceous description.

Another important characteristic is, that a herb, to be considered a weed, should propagate itself either by seeds or buds at a rapid rate, grow fast, and overpower those plants which may check its progress. I take it to be, that this characteristic is emphatically conveyed in the etymology of the word "weed," which, through the Low German verb "*wüen*" (to weed), the Bavarian "*wüeln*," and the High German "*wuchern*" (= to spread or multiply with more than ordinary rapidity), is connected with Wodan or Wuotan (= Odin), the name of the supreme, all-overpowering, irresistible Saxon god, to whom Wednesday, or Wodensday, is dedicated.*

A third, and perhaps more important characteristic is, that a weed appears only on land which, either by cultivation or some other manner, has been disturbed by man. Virgin lands, such as the tops of high mountains, have no weeds; I saw none in the Arctic regions except *Tetrapoma pyriforme*, a Siberian immigrant, which was growing in Norton Sound, on the only cultivated patch I met with in that country. Weeds are therefore essentially intruders, colonists, foreigners, or whatever one likes to call them,—never endemic children of the soil. They may have come from the immediate neighbourhood, but they have always been translated, though the distances may have been but limited. Weeds have therefore to bear up against all the prejudice which the popular mind in all countries invariably entertains against foreigners. The German contemptuously calls weed "*Unkraut*," which is the antithesis of *Kraut* (= herb), and means "no herb," or "strange herb," just as *Ding* (= thing) is the antithesis of *Unding* (= strange thing or monster); thus clearly expressing that weeds do not belong to the herbs of the country, but are something strange, unrecognized. Some-

* This view, I find, is borne out by Jacob Grimm, 'Deutsche Mythologie,' 2nd edit. vol. i. chap. vii. Singularly enough, the High German form for "to weed" is lost, and replaced by the word "*jæten*," pronounced "*gæten*" in some districts. I was very much puzzled about the derivation of this word, till I remembered that "Gæt" was one of the names of the god "Wuotan."

times national prejudices are pointedly expressed in the popular names given to newly imported weeds. Thus the North American Indian names *Plantago major*, the "Footsteps of the White Man;" and the German, the troublesome Peruvian *Galinsoga parviflora*, "Frenchman's Weed," though the French are probably quite innocent of its having become a pest in the sandy districts of Prussia and adjacent States.

Have the plants we designate "weeds" always been weeds? is a question to be answered. If the definition of the term given, and the views taken of the nature of these plants be correct, they cannot have been weeds in their native country; and the deportment of weeds on being translated from one part of the world to another would seem to bear out this view. There are no complaints against our Water-cress becoming an impediment to our rivers and rivulets. Though assisted by cultivation, it is by no means a common or troublesome weed. But look at it in New Zealand, where it threatens to choke up altogether the still rivers, and where its stem often attains 12 feet in length, and $\frac{3}{4}$ of an inch in diameter. *Galinsoga parviflora* is very local in Peru; but mark its extraordinary increase in Europe since it effected its escape from our botanic gardens!

But if weeds have to surmount the obstacles which new-comers in all countries have to face, they also benefit by the advantages derived from their organization coming for the first time in contact with a soil to them altogether virgin. This contact acts so powerfully that, provided the climate and other conditions required for the existence of a species are fulfilled, the new-comers will invariably become the victors in the great struggle for existence which immediately commences between them and the natives. This law seems to apply to the whole of organized nature, and man's own history furnishes some of the most striking proofs of its catholicity. The light-skinned Polynesian, though a dying-out race in the Hawaiian Islands and New Zealand since the arrival of new-comers of Teutonic origin, has nevertheless managed to establish his ascendancy over the indigenous dark-skinned Papuan in many parts of the Fijis. New-comers, always provided they gain a firm footing, have ever the advantage over those species or races established in the country before their arrival. This is well-known to farmers and gardeners, and induces them to procure from distant parts stock and seeds of kinds identical with those already in their posses-

sion, because they know that the newly imported succeed better than their own. The law is further illustrated by our system of rotation of crops, in which one kind of plants is most advantageously replaced by another; and here, at last, we get at a chemical explanation of the advantages enjoyed by new-comers, and why, in a struggle for existence between them and the natives of the soil, they must ever come off victorious.

A weed, then, in our language, signifies a naturalized herb, which has a soft and membranaceous look, grows fast, propagates its kind with great rapidity, and spreads, to the prejudice of endemic or cultivated plants, in places in some way or other disturbed by the agency of man.

There are, in various parts of the world, trees and shrubs, though their number is not so great as at first sight might be imagined, that may be said to occupy the same position amongst woody plants as weeds do amongst herbs. *Psidium Guayava*, *Melia Azedarach*, *Acacia Farnesiana*, and *Crescentia Cujete*, may serve as instances of such trees; the Brazilian *Tecomaria Capensis* at the Cape of Good Hope and other parts of the Old World, and *Ulex Europæus* at St. Helena, as examples of such shrubs. In most places, where we find them, they are exotics, out-elbowing the indigenous vegetation by their rapid growth. But in most cases we know that their geographical range has been extended by their being taken under man's fostering care. The word "Tree-fern" having gained an easy admission in our language, it might be advisable to speak of these plants as tree-weeds and shrub-weeds, without being charged with unnecessary innovation.

Whence do different countries derive their weeds? is a question that naturally suggests itself. Off-hand, one would be inclined to answer that all countries indiscriminately, having a climate similar to that of Europe, would be the sources whence Europe derived its weeds. And to a great measure this is true. Many European weeds have an undoubted Asiatic and African origin; but if any part of the world might be expected to have supplied its due share, it would be the temperate parts of the North American continent, where many European plants, such as Thistles, have multiplied to such an extent as to have become a perfect pest. From the constant intercourse between Europe and North America, and the number of North American plants cultivated in our gardens, one would have expected a great many

North American species to be naturalized among us. But this is by no means the case. North American plants, however easily grown in our gardens, do not show any great disposition to escape from cultivation, and drive the native flora off the field. The same is true of Australian plants; and this peculiarity contrasts strangely with the extraordinary rapidity with which European plants spread in the southern hemisphere, supplanting in New Zealand, New Holland, etc. the native vegetation. "Hitherto," says Dr. Hooker, "no consideration of climate, soil, or circumstance has sufficed to explain this phenomenon." If what I have traced out, that new arrivals have always the advantage over old, be a sound law, it ought to apply to this case as well as the others; and to all appearances it does. We know, from the researches of Unger and others, that a vegetation very similar, not to say absolutely identical, to that of the southern parts of the United States, existed in Europe at the Lignite period, and that a vegetation very similar, if not absolutely identical, with that of Australia, existed in Europe at the Eocene period. But we have no knowledge of the existence of a European Flora in either North America or in Australia at any former geological periods. Plants from Australia and North America would therefore not enjoy in Europe the advantage of new-comers, but would rather be like wanderers returning to a country where their part has already been played out.

AUSTRALIAN VEGETATION, INDIGENOUS OR INTRODUCED, CONSIDERED ESPECIALLY IN ITS BEARINGS ON THE OCCUPATION OF THE TERRITORY AND WITH A VIEW OF UNFOLDING ITS RESOURCES.

By Ferdinand Mueller, Ph.D., M.D., F.R.S.

(*Concluded from p. 174.*)

Only in the south-eastern parts of the continent and in Tasmania do the mountains rise to alpine elevations. Mount Hotham, in Victoria, and Mount Kosciusko, in New South Wales, form the culminating points, each slightly exceeding 7000 feet in height. In the ravines of these summits lodge perennial glaciers; at 6000 feet snow remains on the ground for nearly the whole of the year, and snowstorms may occur in these elevations during the midst of summer. At 5000

feet generally the vegetation of shrubs commences, and up to this height ascend two Eucalypts, *Eucalyptus coriacea* and *Gunnii*, forming dense and extensive thickets; *E. coriacea* assuming, however, in lower valleys, huge dimensions. But these, with most of our alpine plants, would deserve transplanting to central Europe and to other countries of the temperate zone, where they would well cope with the vicissitudes of the climate. In Tasmania the winter snow-line sinks considerably lower, and in its moister climate many alpine plants there descend along the torrents and rivulets to the base of the mountains, which are constantly clinging to cold elevations. Mount William is the only subalpine height isolated in Victoria from the great complex of snowy mountains, but it produces, beyond *Eucalyptus alpina* and *Pultenæa rosea*, which are confined to the crest of that royal mountain, only *Celmisia longifolia* and little else as the mark of an alpine or rather subalpine flora. *Celmisia* also is one of the few representatives of cold heights in the Blue Mountains; and from New England we know only *Scleranthus biflorus*, a cushion-like plant, exquisitely adapted for margining garden plots, as generally indicating spots on which snow lodges for some of the winter months. The mountains of Queensland would need in their tropical latitudes a greater height than they possess for nourishing analogous forms of life. But the truly alpine vegetation of the high mountains of Tasmania contrasts in some important respects with that of the Australian Alps—namely, therein, that under the prevalence of a much higher degree of humidity plants which delight to be bathed in clouds, or in the dense vapours of the surrounding fern-tree valleys, are much more universal; and that the number of peculiar alpine *genera* is much greater than here. Thus, while in Tasmania the magnificent Evergreen Beech (*Fagus Cunninghami*) covers many of the ranges up to subalpine rises, it predominates as a forest tree in Victoria only at the remotest sources of the Yarra, the Latrobe, and the Goulburn rivers, and on Mount Baw-Baw. To this outpost of the Australian Alps (now so accessible to metropolitan tourists) are restricted also several plants, such as *Oxalis Magellanica* and *Libertia Lawrencii*, which are almost universal on all the higher hills of Tasmania. *Fagus Cunninghami*, though descending into our fern-tree ravines, transgresses nowhere the Victorian land-boundaries, but a noble Fagus-forest, constituted by a distinct and equally evergreen species, *Fagus Moorei*, crowns the high ranges on which the Bellinger

and M'Leay rivers rise. This, however, the snowy mountains of Tasmania and of continental Australia have in common, that the majority of the alpine plants do not represent genera peculiar to colder countries, but exhibit hardy forms, referable to endemic Australian genera, or such as are allied to them. So, as already remarked, we possess alpine species, even of *Eucalyptus* and *Acacia*, besides of *Hibbertia, Oxylobium, Bossiæa, Pultenæa, Eriostemon, Boronia, Didiscus, Epacris, Leucopogon, Prostanthera, Grevillea, Hakea, Persoonia, Pimelea, Kunzea, Bæckea, Stackhousia, Mitrasacme, Xanthosia, Coprosma, Velleya, Prasophyllum;* yet *Anemone, Caltha, Antennaria, Gaultheria, Alchemilla, Seseli, Œnothera, Huanaca, Abrotanella, Ligusticum, Astelia, Gunnera*, and other northern or western types, are not altogether missing, though nowhere else to be found in Australia but in glacial regions.

About half a hundred of the highland plants are strictly peculiar to Victoria, the rest prove mainly identical with Tasmanian species; but a few of ours, not growing in the smaller sister land, are, strange as it may appear, absolutely conspecific with European forms. Rather more than one hundred of the lowland plants ascend, however, to the glacial regions. Some of these are simultaneously desert-species.

The only genus of plants absolutely peculiar to the Victorian territory, *Wittsteinia*, occurs as a dwarf subalpine plant, of more herbaceous than woody growth, restricted to the summits of Mount Baw-Baw; this, moreover, remained hitherto the only representative of *Vaccinieæ* in all Australia; it produces, like most of the Order, edible berries.

The verdant summer herbage of valleys, which snow covers during the winter months, will render with increasing value of land-estates these free, airy, and still retreats in time fully occupied as pasturage during the warmer part of the year. Here, in sheltered glens, we have the means of raising all the plants delighting in the coolest climate. Rye-culture could probably be carried on at a considerable elevation.

Of all the phanerogamic plants of Tasmania, about 130 are endemic; of those about 80 are limited to alpine elevations, or descend thence only into cool umbrageous valleys. The generic types peculiar to the island are again almost alpine (*Milligania, Campynema, Hewardia, Pterygopappus, Tetracarpæa, Anodopetalum, Cystanthe, Prionotis, Microcachrys, Diselma, Athrotaxis, Pherosphæra, Bellendena, Cenarrhenes, Archeria*), only *Acradenia* and *Agastachys* belonging seem-

ingly to the lowlands, but show at once a fondness for a wet, insular climate. The few Tasmanian genera, represented besides only in Victoria, are *Richea*, *Diplarrhena*, *Drymophila*, *Juncella*. In the Tasmanian highlands flora, endemic shrubby Asters and *Epacrideæ*, and the singular endemic Pines of various genera, constitute a marked feature. A closer and more extended inquiry into the geological relation of great assemblages of vegetation will shed probably more light on the enigmatic laws by which the dispersion of plants is ruled. Australian forms predominate also in Tasmania at snowy heights, as *Eucalyptus Gunnii*, *E. coccifera*, and *E. urnigera*. The famous Huon-pine (*Dacrydium Franklini*), the Palm-heath (*Richea pandanifolia*), the celery-topped Pine (*Phyllocladus rhomboidalis*), and the deciduous Beech (*Fagus Gunnii*), are among the most striking objects of its insular vegetation. Mosses, Lichenastra, Lichens, and conspicuous Fungi abound both in alpine and low regions; indeed, cryptogamic plants, except *Algæ* and microscopic Fungi, are nowhere in Australia really frequent except in Tasmania, in the Australian Alps, and in the fern-tree glens of Victoria and part of New South Wales. The Musk-tree (*Aster argophyllus*) of Tasmania and South-east Australia is the largest of the few trees produced by the vast Order of *Compositæ* in any part of the globe, while *Prostanthera lasianthos*, its companion, exhibits the only real tree known in the extensive family of *Labiatæ*. The almost exclusive occupation of vast littoral tracts of Gippsland, and some of the adjoining islands, by the dwarf *Xanthorrhæa minor* is remarkable. Mistletoes do not extend to Tasmania, though over every other part of Australia; neither the Nardoo (*Marsilia quadrifolia*), of melancholy celebrity, though to be found in every part of the continent, and abounding in innumerable varieties throughout the depressed parts of the interior. *Equisetaceæ* occur nowhere. The total of the species to be admitted as well defined, and hitherto known, from all parts of Australia approaches (with exclusion of microscopic fungi) to 10,000.

The marvellous height of some of the Australian, and especially Victorian trees, has become the subject of closer investigation, since of late, particularly through the miners' tracks, easier access has been gained to the back-gullies of our mountain-system. Some astounding *data*, supported by *actual* measurements, are now on record. The highest tree previously known was a *Karri-Eucalyptus* (*Eucalyptus colossea*), measured by Mr. Pemberton Walcott, in one of the de-

lightful glens of the Warren River of Western Australia, where it rises to approximately 400 feet high. Into the hollow trunk of this Karri three riders, with an additional packhorse, could enter and turn in it without dismounting. On the desire of the writer of these pages, Mr. D. Boyle measured a fallen tree of *Eucalyptus amygdalina*, in the deep recesses of Dandenong, and obtained for it the length of 420 feet, with proportions of width, indicated in a design of a monumental structure placed in the Exhibition; while Mr. G. Klein took the measurement of a *Eucalyptus* on the Black Spur, ten miles distant from Healesville, 480 feet high! Mr. E. B. Heyne obtained at Dandenong as measurements of heights of a tree of *Eucalyptus amygdalina*:—Length of stem from the base to the first branch, 295 feet; diameter of the stem at the first branch, 4 feet; length of stem from first branch to where its top portion was broken off, 70 feet; diameter of the stem where broken off, 3 feet; total length of stem up to place of fracture, 365 feet; girth of stem three feet from the surface, 41 feet. A still thicker tree measured three feet from the base, 53 feet in circumference. Mr. George W. Robinson ascertained in the back-ranges of Berwick the circumference of a tree of *Eucalyptus amygdalina* to be 81 feet at a distance of four feet from the ground, and supposes this eucalypt, towards the sources of the Yarra and Latrobe rivers, to attain a height of half a thousand feet. The same gentleman found *Fagus Cunninghami* to gain a height of 200 feet and a circumference of 23 feet.

It is not at all likely that in these isolated inquiries chance has led to the really highest trees, which the most secluded and the least accessible spots may still conceal. It seems, however, almost beyond dispute, that the trees of Australia rival in length, though evidently not in thickness, even the renowned forest-giants of California, *Sequoia Wellingtonia*, the highest of which, as far as the writer is aware, rise in their favourite haunts at the Sierra Nevada to about 450 feet. Still, one of the mammoth-trees measured, it is said, at an estimated height of 300 feet, to have shown yet 18 feet in diameter! Thus to Victorian trees for elevation the palm must apparently be conceded. A standard of comparison we possess in the spire of the Minster of Strassburg, the highest of any cathedral of the globe, which sends its lofty spire to the height of 466 feet, or in the great pyramid of Cheops, 480 feet high, which if raised in our ranges would be overshadowed probably by Eucalyptus-trees.

The enormous height attained by not isolated, but vast masses of our timber-trees in the rich diluvial deposits of sheltered depressions within Victorian ranges finds its principal explanation, perhaps, in the circumstance that the richness of the soil is combined with a humid geniality of the climate, never sinking to the colder temperature of Tasmania, nor rising to a warmth less favourable to the strong development of these trees in New South Wales, nor ever reduced to that comparative dryness of air which even to some extent in the mountain ravines of South Australia is experienced. The absence of living gigantic forms of animal life amidst the hugest vegetable forms is all the more striking.

Statistics of actual measurement of trees compiled in various parts of the globe would be replete with deep interest, not merely to science, but disclose also in many instances vast resources but little understood up to the present day. Not merely, however, in their stupendous altitude, but also in their celerity of growth, we have in all probability to concede to Australian trees the prize. Extensive comparisons instituted in the Botanic Gardens of this metropolis prove several species of Eucalyptus, more particularly *Eucalyptus globulus* and *Eucalyptus obliqua*, as well as certain Acacias—for instance, *Acacia decurrens* or *Acacia mollissima*—far exceeding in their ratio of development any extra-Australian trees even on dry and exposed spots, such into which spontaneously our Blue Gum-trees would not penetrate. This marvellous quickness of growth, combined with a perfect fitness to resist drought, has rendered many of our trees famed abroad, especially in countries where the supply of fuel or of hard woods is not readily attainable, or where for raising shelter, like around the cinchona-plantations of India, the early and copious command of tall vegetation is of imperative importance. To us here this ought to be significant. I scarcely need refer to the fact that for numerous unemployed hands the gathering of Eucalyptus seeds, of which a pound weight suffices to raise many thousand trees, might be a source of lucrative and extensive employment. In Australian vegetation we probably possess the means of obliterating the rainless zones of the globe, to spread at last woods over our deserts, and thereby to mitigate the distressing drought, and to annihilate perhaps even that occasionally excessive dry heat evolved by the sun's rays from the naked ground throughout extensive regions of the interior, and wafted with

the current of air to the east and south, miseries from which the prevalence of sea-breezes renders the more littoral tracts of West and North Australia almost free. But in the economy of nature the trees, beyond affording shade and shelter, and helping to preserve the humidity of the soil, serve other great purposes. Trees, ever active in sending their roots downwards, draw unceasingly from below the surface-strata those mineral elements of vegetable nutrition on which the life of plants absolutely depends, and which with every dropping leaf is left as a storage of aliment for the subsequent vegetation. How much lasting good could not be effected, then, by mere scattering of the seeds of our drought-resisting Acacias and Eucalypts and Casuarinas at the termination of the hot season along any watercourse, or even along the crevices of rocks, or over bare sands or hard clays, after refreshing showers? Even the rugged escarpments of the rocky, desolate ranges of Tunis, Algiers, and Morocco—even the Sahara itself, if it could not be conquered and rendered habitable, might have the extent of its oases vastly augmented, fertility might be secured again to the Holy Land, and rain to the Asiatic plateau or the desert of Atacamas, or timber and fuel be furnished to Natal and La Plata. An experiment instituted on a bare ridge near our metropolis shows what may be done.

Not Australia alone, but some other countries, have judiciously taken advantage of the facilities afforded by Australian tree-vegetation for raising woods, an object which throughout the interior might be initiated by rendering this an additional purpose of the expeditions to be maintained in the field for territorial and physiographical exploration; and more, it might deserve the attention of the Legislature, which allots to the pastoral tenants their expansive tracts of country, whether or not along with squatting pursuits—indeed, for the actual benefit of the pastoral occupant himself—the inexpensive first steps for general forest-culture in the woodless regions should not be commenced.

Within the ranges which produce these colossal trees but few habitations exist; indeed, we might traverse a line of a thousand miles as yet without a dwelling. The climate is salubrious; within the sheltered glens it could, in excellence, not be surpassed. Hot winds, from which our exposed plains, as well as any rises of northern and western aspect, so much suffer, never reach the still and mild vales of the forests; frosts are only experienced in the higher regions. Speaking of Vic-

toria especially, it is safe to assert that there alone many thousand square miles of mountainous country, timbered with Stringy-bark trees (*Eucalyptus obliqua*), are as yet lying dormant for any other but isolated mining operations. And yet, might not families who desire to strike out a path of independent prosperity, who seek a simple patriarchal life in a salubrious locality of seclusion, and who command the needful strength of labour within their own circle, choose these happy glens as their permanent abodes? Though the timbered rises of the ranges may be as yet unlucrative for cultivation, or even be sterile, the valleys are generally rich, irrigated by clear brooks, and spacious enough for isolated homes, and the limited number of pasture animals appertaining to them. The costlier products of culture might be realized, especially in the fern-tree glens; tea, and possibly cinchona, and coffee also; lucrative fibres, dye plants of easy growth and simple preparation, as instanced by grass-cloth, or madder; or medicinal plants, such as Senna, and various herbs, or perhaps even the *Erythroxylon Coca*, a plant of almost fabulous properties; or, should the settler prefer, beyond raising the simple requirements for his rural life, to devote his attention solely to the gain which the surrounding timber treasures are certain to offer, he will find ample scope for his energy and industry. The Eucalypts, as now proved by extensive and accurate experiments, will yield him tar in abundance; they will furnish fibres, even those of Stringy-bark, as one of the cheapest and most extensively available paper material. By a few simple appliances he may secure, simultaneously with the tar, also wood-vinegar and wood-spirit; and these again might locally at once be converted into dye materials and varnishes. He might obtain potash from woods, and volatile oils from the leaves of Eucalypts, in almost any quantity, by simple processes and with scarcely any cost. He might gather the gum-resins and barks for either medicinal or tanning purposes, or he might effect a trade in fern-trees; he might shake the *Eucalyptus* grains out of their capsules, and might secure locally other mercantile substances far too numerous to be enumerated here. Whoever may choose these ranges as a permanent home, and thoughtfully direct his attention to the future, will recognise that the mere scattering of the acorns of the Cork-tree or the seeds of the Red Cedar over cleared and yet sheltered ground, or the planting of the Vine and Olive, will become to his descendants sources of great riches.

In closing these concise and somewhat chaotic remarks, which scarcely admit of methodical arrangement, unless by expansion into the chapters of a volume, we may—indulging in a train of thoughts—pass from special to general considerations.

Belgium, one of the most densely populated of all countries, and yet one of the most prosperous, nourishes within an area less than one-half that of Tasmania a population three times exceeding that of all Australian colonies; yet one-fifth of the Belgian territory consists of forests. Not to a considerable extent smaller than Europe, our continent is likely to support in ages to come a greater population, because, while here no frigid zone excludes from any portion of the territory productiveness, or reduces it to very circumscribed limits, it embraces a wide tropical tract, destined to yield products nowhere to be raised under the European sky. The comparatively unbroken uniformity of vast tracts of Australia certainly restricts us here for the magnificent scenery and the bracing air of the country of our youth to the hilly coast-tracts. But still, we have not to endure the protracted colds of middle and north European winters nor to contend with such climatic difficulties which beset field operations or pastoral pursuits, and which by patient perseverance could not be removed or materially lessened.

While we are deprived of advantages so pleasing and so important as those of large river communications, we enjoy great facilities for land traffic, facilities to which every new discovery of coal-layers will add.

Judicious forest culture, appropriate to each zone, will vastly ameliorate the climate, and provide for the dense location of our race; for transplanting of almost every commodity both of the vegetable and animal kingdom, we possess, from the alp to the steppes, from the cool mountain-forests to the tropic jungles, conditions and ample space.

River waters, now flowing unutilized to the ocean, when cast over the back plains, and artesian wells also, will effect marvellous changes. Steam power and the increased ingenuity of machinery applied to cultivation will render the virgin soil extensively productive with far less toil than in older countries, while the teachings of science will guard us against the rapacious systems of culture and the waste of fertilizers, which wellnigh involved ruin to many a land. Of ferocious land animals, Australia is free. We have neither to encounter

extensive hordes of savages to dispute the possession of the soil, nor the still more dangerous opposition of half-civilized barbarians, such as for ages yet may obstruct the progress of civilization in the great interior of Africa.

Our continent, it may be foretold prophetically, will ere long be regarded of so high a territorial value that *no* tract, however much disregarded now, will remain unoccupied. Our continent, surrounded moreover by the natural boundaries of three oceans, free and unconnected, must advance, by extraneous influences undisturbed, by ancient usages unretarded, to that greatness to which British sovereignty will for ever give a stability.

ENUMERACION DE LAS MELASTOMACEAS DE CHONTALES EN NICARAGUA RECOGIDAS POR EL SR. DR. B. SEEMANN.

POR JOSÉ TRIANA.

Durante el último viage que el Sr. Seemann ha hecho á Nicaragua, él recogió algunas especies de Melastomaceas, dignas de interés por su novedad, su sinonimia ó su distribucion geográfica. Vàmos á enumerarlas.

1. *Calophysa setosa*, Triana (n. sp.) ; fruticosa, macrophylla, subisophylla ; ramis teretibus petiolis nervisque subtus setis longis densis reflexis horridis ; foliis petiolatis late ovatis vel ovato-oblongis abrupte acuminatis subcordatis basi in vesicam bilobam limbo ipsi contiguam aut petiolo insidentem inflatis minute crenulato-densatis subciliatis 7-nervis, supra et subtus inter nervos sparse longe pilosis v. glabratis ; paniculis corymbosis axillaribus v. subterminalibus multifloris ; pedunculo gracillimo ; floribus (pro planta) minutis ; calyce campanulato quadridentato, lobis setis paucis elongatis auctis ; antheris linearibus breviter calcaratis.

Esta planta notable se distingue facilmente por sus ramos erizados de pelos largos reflejados hacia atras.

2. *Conostegia bracteata*, Triana (n. sp.) ; arborea, subisophylla, pube laxa rufescente hirtella ; ramis junioribus sulcato-tetragonis ; foliis breviter petiolatis ovato-ellipticis attenuato-acuminatis minute crenulatis utrinque subsericeo-pilosis 5-nervis ; paniculis terminalibus v. a ramo

laterali demum excrescente axillaribus folio brevioribus, alabastris ovoideo-acutis; pedunculis pedicellisque dense hirsutis; floribus in glomerulos terminales congestis 5-meris; bracteis subfoliaceis.

Esta especie se caracteriza facilmente por sus flores acompañadas de bracteas y agrupadas en glomérulos en las extremidades de las divisiones de la panoja.

3. *Adelobotrys adscendens*, Triana.—*Melastoma adscendens*, Sw. Fl. Ind. Occ. iii. 772; De Cand. Prod. iii. 202. *M. scandens*, Sw. Prod. 69, non Aubl. *Davya Guyanensis*, De Cand. l. c. 105, et Mém. sur les Mélast. *Adelobotrys scandens*, Macfad., non De Cand. *Davya adscendens*, Griseb. Fl. West Ind. Isl. p. 265. *Sarmentaria decora*, Ndn. Ann. Sc. Nat. 3me. Sér. tom. xviii. 140.

En el Museum Británico se hallan los ejemplares auténticos de la *Melastoma adscendens* de la Flora de Swartz ó su *Melastoma scandens* de su Prodromo, con los cuales concuerdan exactamente los sinónimos que le atribuimos. Esta planta de parages montañosos, se señala por su distribucion geográfica en la Guyana, las Antillas, Méjico, y la América central, donde la ha descubierto ultimamente el Sr. Dr. Seemann.

De Cand. publicó su *Davya Guianensis*, sin duda, sin haber conocido la *Melastoma adscendens* de Swartz.

4. *Clidemia hirta*, Don in Mem. Soc. Wer. iv. 306, excl. syn., Mill. *Melastoma hirta*, Swartz, Obs. 175; Linn. Sp. 559, excl. syn. Plum. sp. 18, Icon. 141, et figura Sloani, ii. t. 197, f. 2, monente Swartz; Sims, Bot. Mag. t. 1971; Willd. Sp. Pl. ii. 888, excl. syn. Mill.—Arbuscula Jamaicensis quinquenervis, minutissime dentatis, foliis et caule pubescentibus, Pluk. Phyt. t. 264. f. 1, fide spec. auth. *Clidemia crenata*, De Cand. Prod. iii. 157, n. 16, non Don. *Melastoma crenata*, Vahl, Ecl. Am. iii. 41; Icon. Plant. Am. ii. t. 24. *Clidemia pauciflora*, DC. l. c. 157. *Melastoma pauciflora*, Desr. in Lamk. Dict. iv. 39. *Clidemia dentata*, Don, l. c., fide sp. auth. *Staphidium pauciflorum*, *Wilsonii*, *chrysanthum*, *Hostmanii*, Ndn. Ann. Sc. Nat. *Clidemia tiliæfolia*, DC. l. c. 158. *Clidemia elegans*, Don, l. c.; De Cand. l. c. *Melastoma elegans*, Aubl. Guyan. i. 427. t. 167. *Clidemia leptoclada*, Cruger in Linn. xx. 103. *C. Benthamiana*, Miquel in Linn. xviii. 276. *C. purpurea*, DC. l. c. 159 (non Don). *Melastoma purpurascens*, Domb. in Herb. M. Par. *Staphidium purpureum*, Ndn. l. c. *Staphidium azureum*, Ndn. l. c.

Planta que tiene una distribucion geográfica muy estensa, que varia mucho en cuanto á la forma y grandor de las hojas, y la profundidad de sus almenaduras.

5. *Aciotis circæoides.—Spennera circæoides*, DC. l. c. 116 ; Ndn. l. c.

6. *Acisanthera recurva.—Microlicia recurva*, DC. l. c. n. 7. *Rhexia uniflora*, Vahl et Spreng. *Uranthera recurva*, Ndn. l. c. (ann. 1845) 189 et (ann. 1849) 283. *Rhexia Acisanthera*, Will. non Linn. *Uranthera Hostmannii*, Ndn. l. c. xii. 284. *Rhynchanthera adenophora*, Miq.

7. *Centradenia inæquilateralis*, Don, Gen. Syst. ii. 765.—*Rhexia inæquilateralis*, Schlecht. et Cham. in Linn. v. 567. *Plagiophyllum parvifolium*, Schlecht. in Linn. xiii. 428. *Centradenia rosea*, Lindl. Bot. Reg. (ann. 1843) 29. t. 20 ; Paxton, Mag. of Bot. x. 101.

8. *Conostegia rufescens*, Ndn. Ann. Sc. Nat. ser. 3. xvi. 108.

9. *Oxymeris* . . .—*Clidemia inæquifolia*, DC. ? l. c. 164. n. 72.

10. *Octopleuria micrantha*, Griseb. Fl. W. Ind. Isl.—*Melastoma micranthum*, Sw. Prod. 71 ; Fl. Ind. Occ. ii. 803. *Ossæa micrantha*, Macf. *Sagræa neurocarpa*, Naud. l. c. xviii. 94.

11. *Triolena hirsuta.—Bertolonia hirsuta*, Benth. in Bot. of Voy. Sulph. 94.

12. *Topobea multiflora ?*, Don, Mem. Soc. Wer. iv. p. 326 ; DC. l. c. 198.

13. *Miconia* sp.—Esta especie de *Miconia* tiene las flores desprovistas de petalos y estambres, y por eso no puede determinarse exactamente ; pero tiene parentesco con la *Miconia hyperprasina* de M. Naudin.

AN UNDESCRIBED CASUARINA FROM WEST AUSTRALIA.

By Dr. F. Mueller, F.R.S.

Whilst selecting some materials of my museum for the forthcoming volume of De Candolle's great work, I took occasion to examine some of the more remarkable plants prior to their transmission to Europe. One of these is singularly interesting in a morphological point of view ; and, as it does not perhaps exist in any other collection, I shall make a preliminary record of it. The plant is a *Casuarina*, with the feature

of an acicular *Hakea*, or one of the acerose *Melaleucæ*, producing two-jointed ultimate branchlets, the upper joint exceeding the lower many times in length, and assuming the form of a real leaf. The four apices of this leaf-like joint cohere into a sphacelate point. The male flowers are, as yet, unknown, but the fruit is precisely that of congeners.

The following diagnosis comprises the cardinal characters as far as they are extant in the specimens gathered by the late meritorious James Drummond, from whose enlightened son the Melbourne botanical museum received the whole normal collection of plants secured by his father during a long series of years in West Australia, many of the plants being solely contained as yet in this collection.

Casuarina acuaria (n. sp.); ramulis ultimis quaterno-verticillato biarticulatis, membro infero perbrevi in dentes (folia) quatuor semilanceolatos desinente, *membro supero in folium acuarium inarticulatum elongato*, strobilis ambitu globosis, paribus bracteolarum fere octoseriatis, bracteis ciliatis breviter cuspidatis, bracteolis valvaribus (seminigeris) semiexsertis, lamina harum exteriore in rostrum pertenue longumque prostrata, lamina interiore e dorso brevius rostrata intus subtiliter pubescente, seminum nucleo spadiceo ovato-rhombeo, ala eorum cordato-deltoidea excursu nervi mediani curvato-mucronulata.

In Australia occidentali.

NOTE ON THE GENUS DIPLANTHERA.

By Dr. F. Mueller, F.R.S.

The genus *Diplanthera*, established by Banks and Solander, was placed by R. Brown provisionally at the end of *Solaneæ*, and allusion was made by that great phytologist to its apparent approach to *Scrophularineæ*, or, perhaps, to *Gesneraceæ* and *Sesameæ*. The illustrious Bentham placed the genus, without having a ready opportunity of examining it, among *Scrophularineæ*, next to *Wightia* and *Powlownia*. Under these circumstances it is not surprising that neither Dr. Vieillard nor Dr. Bureau recognized the genus when a new species from New Caledonia turned up. Neither did the writer of these remarks have his attention directed to *Diplanthera* when describing his *Bulweria* as a truly Bignoniaceous genus. To Dr. Seemann is due the

credit of having first of all pointed out the identity of that genus with *Deplanchea*, shortly before established. The rudiment of a fifth stamen seems absent in *Diplanthera tetraphylla*. But should the fruit of *Deplanchea* not exhibit any difference from that pointed out in *Diplanthera* (conf. Fragm. Phytogr. Austr. v. 72), then the New Caledonian plant would rank as a second species under the name of *Diplanthera Deplanchei*.

CORRESPONDENCE.

"*A New Arrangement of Phanerogamous Plants with especial reference to Relative Position, including their Relations with the Cryptogams.*"

Mount Vernon, Hampstead, May 20, 1867.

With reference to this work, I beg to notice that although twelve months have elapsed since it was published, I have not hitherto heard of a single objection to the arrangement of the Phanerogamous plants, either Endogens or Exogens, which form the main part of the work, the arrangement of the Cryptogams being only subordinate, as the title of the work implies.

There is, however, apparently an objection in the otherwise entirely favourable review of the work which appeared in the 'Journal of Botany,' in December last, Vol. IV. p. 379. The party, however, who wrote that review informs me that he has no objection to name against the arrangement of either the Endogens or Exogens, though he may not quite agree to all the particulars, and I therefore have not heard of any objection from him; but his critical objections, he informs me, referred more especially to the placing of the higher Cryptogams; but whether the proposed arrangement of the Cryptogams is practicable or not, is entirely immaterial to the arrangement of the Endogens, Exogens, and Gymnosperms, because, if they were all removed, the arrangement of these classes would remain unaltered, as they form no part of the system of Phanerogamous plants. His objections to the placing of the higher Crytogams in the positions they occupy, he informs me, depend on a different view of the nature of a spore to that which I take, and it remains therefore for future researches to show which view is the more correct. The positions of *Lycopodiaceæ* and *Marsiliaceæ*, I fully admit, rest on insufficient evidence, and are, so far, clearly open to criticism, and their positions are only provisional; but up to the present time I see no sufficient reasons for alterations. This difficulty, it appears to me, could be very satisfactorily avoided by placing these two families with the other Vascular Cryptogams in Table V., but I hope their present positions can be maintained.

In the prospectus it was mentioned that "the principles of the proposed arrangement might be confidently expected to lead directly to the accomplishment of the long-sought Natural System," and up to the present time

I have no reason whatever to doubt that the expectation will be fulfilled, especially as numerous additional facts continually occurring materially confirm them.

The Rev. W. Hincks, Prof. Nat. Hist. Univers. Coll. Toronto, Canada, writes, in his review of the work in the 'Canada Journal,' p. 241, 1867:—"The elaborate tables given by the author form a most interesting study to any one desiring to understand the affinities of plants:" and Mr. Hereman, in a letter acknowledging the receipt of the work, writes, "I need scarcely say I have been exceedingly interested in the perusal of your very elaborate work, which must have cost you a very great amount of thought and labour. I think with you, that you have probably hit upon the outlines (at least) of the natural arrangement of plants. A few years ago I was led to try and adopt a system for my own use bearing in part on your ideas, but time did not permit me to mature it. I may, perhaps, in a future work of mine, see my way into recommending its general adoption; at least I so judge from what I see at present."

B. CLARKE.

P.S.—After the above was written, I learned that one critic has objected to the position of *Palmaceæ*, in which, I doubt not, he is mistaken.

New Zealand Plants.

Among the plants included in Hooker's 'New Zealand Flora' are two which have been introduced into the country, if we are to believe native traditions. The two alluded to are the Karaka (*Corynocarpus lævigata*), and the Kowhai Ngutu Kaka, *i. e.* Parrot-bill Kowhai (*Clianthus puniceus*).

The Karaka was introduced by the crews of the first canoes which reached New Zealand from the Samoan or Roratongan islands, *vide* Sir G. Grey's work on New Zealand Traditions, and in Shortland's 'Traditions of New Zealand.'

The history of the *Clianthus* is different, as I have heard the following story in New Zealand:—

The natives relate that years ago a French vessel was wrecked on the New Zealand shores, the crew disposed of, and the vessel searched for valuables: amongst other things found were a number of small packets, which were pitched away as soon as they were ascertained to contain only seeds. A year or so after, the natives again visited the wreck, and found the *Clianthus* growing near the spot. They were so delighted with the flower that they took trouble to propagate the plant.

This story is borne out by what Dr. Hooker mentions in the 'Flora of New Zealand,' namely, that it is found "especially near native dwellings."

Yours,

JOHN D. ENYS.

R.M.S.S. 'Douro,' May 20, 1867.

NEW PUBLICATIONS.

Maori-Latin Index to the Handbook of the New Zealand Flora. Wellington: printed under the Authority of the New Zealand Government, by G. Didbury. 1866. 8vo, pp. 8.

We were glad to receive this useful "Index," and should have responded to the invitation of reprinting it in our Journal, if the whole of it had not been incorporated in the recently published part of Dr. Hooker's 'Handbook of the New Zealand Flora.' We understand that it is the intention of the editors to bring out a new edition of it, and that being the case, we would direct their attention to several points that appear to us important. We do not find the names "Hue" (Gourd), "Nikau" (the New Zealand Palm), "Mairehau" (*Phebalium nudum*), and several others. The spelling of the scientific names is frequently incorrect, and we notice several slips of the pen in the native names also; for instance, "Popopor*a*" instead of Poropor*o* (*Solanum*, sp. pl.), "Rautawhiri Nair*u*," instead of Rautawhiri Nair*a* (*Pittosporum*), "Karetn," instead of Karetu (*Hierochloe redolens*), etc. The general name for *Juncus* ought to be always spelt "Wiwi," not "Whiwhi," as it is in one instance.

All these points are far from trifling if the list is to serve for critical purposes. These Maori names will help us materially to fix, not only the exact country whence the New Zealanders emigrated, but will also be, in many instances, a guide to the spots whence many New Zealand plants were derived. We are told that the first canoes that landed in New Zealand brought with them the seeds of the Karaka (*Corynocarpus lævigata*, Cunn.), which would thus be a naturalized, not an indigenous plant of New Zealand. Those islands, with the language of which the Maori dialect has the greatest affinity, are Raratonga (in latitude 18° to 22° S.) and Humphrey's Island (lat. 10° to 28° S.). But unfortunately their vegetation, and the vernacular names of their Flora, are unknown; if anywhere, however, the Karaka, and probably other New Zealand plants, may be expected to be found, it is in those islands.

But few plants of tropical Polynesia are identical with New Zealand ones. Hence but few of their names could be affixed by the first settlers, when, after leaving their tropical home, they landed in New Zealand.

They did so in the case of the Kumara (*Batatas edulis*); but in many more instances they gave the tropical Polynesian names to New Zealand species, which closely resembled in look certain tropical ones with which they were familiar in the cradle of their race. The Tahitian dialect is very near that of Raratonga and Humphrey's Island, and by comparing this "Index" with the published lists of Tahitian names, it will be seen that this transferring of names has been done with great success. For instance, the Tahitian name for *Metrosideros polymorpha* is Rata or "Pua (flower) Rata;" in New Zealand the name of Rata is given to two other red-flowering *Metrosideri;* Ti, in Tahiti given to *Dracæna terminalis*, is in New Zealand applied to various other *Dracænas* (*Cordylines*); Kawa, a general Polynesian name for *Piper methysticum*, is in New Zealand conferred upon the very similar *P. excelsa;* Poroporo, in Tahiti given to *Solanum anthropophagorum*, is applied in New Zealand to *S. aviculare*, with which some botanists even have confounded the Tahitian species; Pohue (perhaps from *po*, night, and *hue*, gourd) is the Tahitian name for *Convolvulus maritimus*, in New Zealand it is restricted to *C. sepium;* Tutu is the Tahitian name of *Colubrina Asiatica*, in New Zealand it is applied to *Coriaria myrtifolia*, the leaves of which somewhat resemble those of the *Colubrina*. That the Maoris at one time inhabited a country where cotton grew is clear from their importing the Polynesian name (Vau=Whau) for cotton, and giving it, in the absence of all species of *Gossypium*, to the only New Zealand plant that somewhat resembled Cotton in leaf, viz. *Entelea arborescens*. We should have been glad to know the vernacular name of *Morus papyrifera*, as the plant is one of the few tropical ones introduced by the early Maori settlers, and was cultivated in the Northern Island at Captain Cook's time; for which we have the testimony of Forster in his 'Prodromus,' and that of Banks and Solander, whose specimens exist at the British Museum.

Now that by the help of Dr. Hooker's excellent 'Flora' and 'Handbook,' the study of New Zealand plants has been placed on a sound footing, we would advise New Zealand botanists not only to persevere in making this 'Index' as complete and correct as possible, but also endeavour to obtain, perhaps through traders or missionaries, a list of the vernacular names of Raratonga and Humphrey Island plants, for the purpose of critical comparison. We have shown what importance attaches to this study, and we thank the compilers of this 'Index' for the useful materials they have already placed at our command.

The London Catalogue of British Plants. Published under the direction of the London Botanical Exchange Club. Sixth Edition. London: Hardwicke. 1867.

A complete Catalogue of the plants of any country gives much more information than might be at first imagined; in proportion to the knowledge, judgment, and capability of the compiler or compilers, it will be a true and accurate exposition of the existing state of Botanical science in the country. This is especially the case when it can be compared with similar catalogues of an earlier date, as in such cases the *progress* of the science can be also traced. The novelties and recently discriminated plants being entered, the nomenclature and arrangement improved, and all carefully revised, the list becomes an epitome of all that has been done in the interval between its appearance and that of its predecessor, and an index of the progress made.

The present Catalogue is the sixth edition of that which has been for more than twenty years the recognized list of British Plants by which the working botanists of this country have been accustomed to arrange and label their specimens. The new edition will doubtless maintain the same position, and is decidedly an advance on any of its predecessors.

Ten years have elapsed since the fifth edition of this Catalogue was published, and during that time the progress of British Botany has been very great. A large amount of new matter is embodied in Mr. Syme's new 'English Botany,' and we are told that the present Catalogue may be received as the old list "partially adapted" to this important work.

Though the progress of ten years is on the whole well expressed in the list before us, this is less apparent than it might be, in consequence, as it seems to us, of the retention of a feature of the old Catalogue, which should have been either omitted or remodelled. We allude to the old series of numbers prefixed to the species. Originally, in the first edition, this was a perfectly consecutive series of numbers from 1 to 1428; but as years have passed, "species" have been "lumped" and "split," new plants have been found, and old ones excluded, and these changes have on the one hand made gaps in the series, and on the other have caused many species to bear the same number, and thus the series has become very uneven. As long as the Catalogue remained unaltered in arrangement, the sequence of species being the same, this

plan of keeping up the old series was of some little convenience, though in the last edition its advantages were at best doubtful; but now that the order of the species has been in many cases disturbed, and the list altogether much modified, it is difficult to imagine what object is served by keeping up this numeration of twenty-three years' standing. All the inconveniences of the list of 1857 remain, with the additional awkwardness of a new representative number for those plants whose position has been altered.

In addition to this, the retention of these numbers has, we fear, been of harm in another way, for they have been made of primary importance. We are informed that the list is "adapted to recent changes" only "in so far as adherence to the numbers would allow," and this principle is carried out only too well. In the Catalogue are included 1471 "species," 193 "intermediate," and 455 "varieties," which have been so manipulated as to be compressed into the series of numbers from 1 to 1428. Of course, on such a principle inequalities and inconsistencies appear, and a statement is rendered necessary to the effect that the plants included in either of the three grades are none of them "co-equal among themselves."

It is dangerous to venture to generalize after the last-quoted statement, but it appears that there is visible in this edition a tendency to reduce the aggregate "species." Notwithstanding the additions to the British Flora since 1857, there are but 1471 full species in the edition of the present year against 1496 in that of the former date; besides this, the truly indigenous Flora is still further reduced in this edition, 124 species being marked as probably introduced, whilst only 115 were so distinguished in the Catalogue of 1857.

The "excluded species" are given in two separate lists instead of three as in the last edition. The first list contains the "aliens, casuals, and waifs of cultivation," and 116 plants of very unequal degrees of naturalization are included in it. The examples of *Silene Italica*, *Aremonia agrimonioides*, *Crucianella stylosa*, *Datura Stramonium*, *Euphorbia salicifolia*, and *Castanea vesca*, will illustrate this inequality. The second list comprises "ambiguities, errors, impositions, and extinctions," and is a motley group of plants, 154 in number. Such plants as *Delphinium Consolida*, *Glaucium phœniceum*, and *Ammi majus*, do not seem to come well under either of the above four heads, and ought rather to be in the first list.

Notwithstanding these defects, this is very much the best Catalogue of British Plants existing; an especially useful feature in it is the addition of a number to each plant representing its distribution in Britain. To those acquainted with the "Cybele," it is not necessary to say that Britain is divided into 18 provinces and 112 counties and sub-counties. In the fifth edition of this Catalogue the census was given as far as provinces are concerned, but in this it is carried on to the minor divisions, and so gives a really good view of the rarity or frequency of each species.

The appearance of the list has been improved by the change of publisher, but we are sorry to see it increased in size and price; the arrangement of the names in two columns instead of three as heretofore, is one cause of the increased size, but very many more sub-species and varieties are entered.

BOTANICAL NEWS.

Mr. Horace Mann is publishing in the 'Proceedings of the American Academy' a critical list of the plants of the Hawaiian (Sandwich) Islands, which he has considerably augmented by his own explorations.

Signor Ardoino, of Mentone, has published a handy 'Flore Analytique des Départements des Alpes-Maritimes,' which will prove useful to the numerous English and other visitors who spend the winter in that district. It is remarkably rich in species, no less than 2466 being recorded in this volume, and rich also in the varied forms which are to be found within a limited space, ranging from the Alpine plants of the Cima dei Gelas and other peaks of the Maritime Alps to the African species found in the vicinity of Mentone, Nice, and Cannes.

Dr. Mellor, Curator of the Botanic Gardens of Mauritius, and formerly a member of the Livingstone expedition, had arrived at Cape Town. He considered the intelligence respecting the death of Dr. Livingstone to be authentic.

Mr. Triana, for exhibiting a collection of economic and officinal plants of New Granada at the Paris Exhibition, has received a gold medal worth several thousand francs.

Dr. Pritzel has published a second part, consisting of 298 pages, of his 'Iconum Botanicarum Index Locupletissimus,' which enumerates all the botanical figures published to the end of the year 1865. The author has displayed the same care and industry in the compilation of this as in the first part of the work,—a work indispensable to every working botanist, and for the publication of which we cannot feel sufficiently grateful.

Mr. M. C. Cooke has added to Pteridology 'A Fern Book for Everybody, containing all the British Ferns, with the Foreign Ferns suitable for a Fernery,'

which contains a chapter on the fungi of Ferns, to which we would call special attention.

The Bulletin of the Botanical Society of France says that the International Botanical Congress, which will be held in Paris in August next, will derive great advantage from the pacific state of Europe, and probably have the benefit of the presence of M. Alphonse De Candolle, who is to draw up a programme, in which the different contested points as to the nomenclature of plants, etc., will be put down for discussion. It also remarks that some fine collections of fossil plants and other objects of high botanical interest will be exhibited.

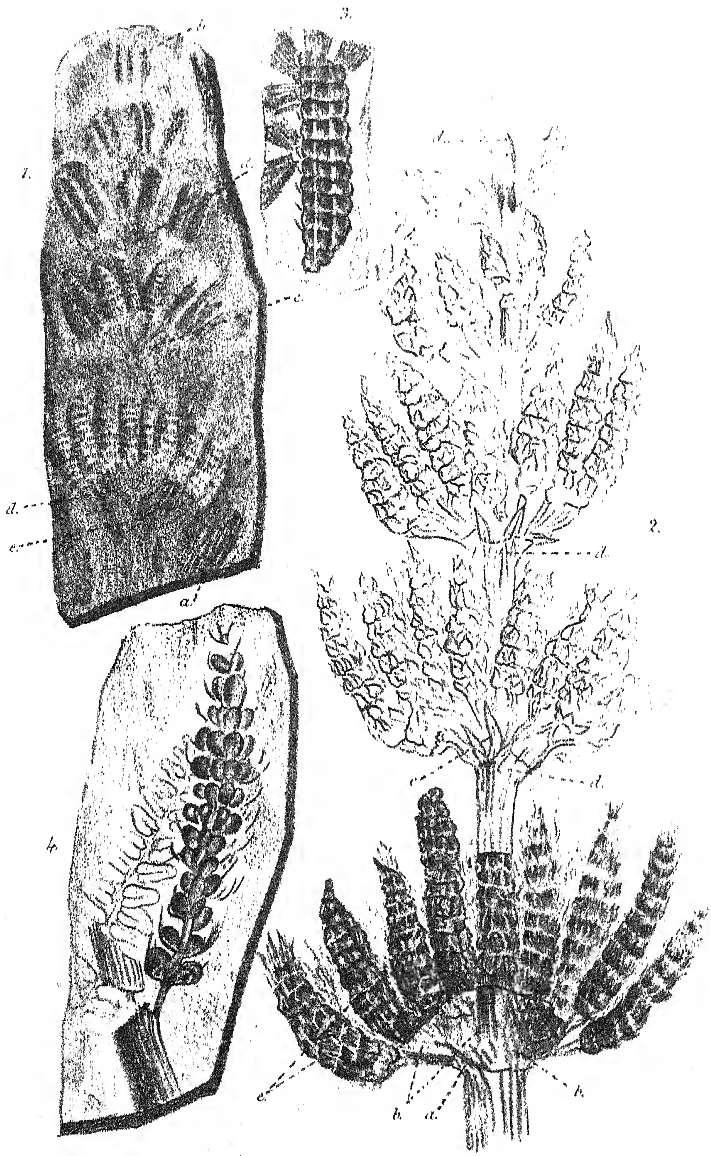
From the report of Drs. Anderson and Cleghorn we learn that the Mahogany-tree thrives well in India, and that its cultivation might be profitably extended.

Mr. Charles Moore, the Director of the Sydney Botanic Garden, and Mr. M'Ivor, the Director of the Ootacamond Botanic Garden, are now on a visit to this country.

Dr. Milde's 'Monographia Equisetorum,' in which he has been engaged for so many years, has at last appeared. It fills an entire quarto volume of the Nova Acta of the Imperial German Academy Naturæ Curiosorum, and gives plates of every known species of Horsetail, embracing the most minute structural details. He reduces the entire number of species to 25, distributed over the whole globe, with the exception of the Australian Continent.

Our last year's obituary should have included the name of Baron von Siebold, Doctor and Colonel in the Dutch service, who died on the 18th of October at Munich, and to whom we are indebted for much of our present knowledge of the Japan Flora. Siebold was born at Würzburg, and was 71 years old when he died, after a short illness. Up to the last he was busy with arranging his extensive Japan ethnological collections for public exhibition.—Julius von Warszewicz is another botanist whose death we have to deplore. Warszewicz was a Lithuanian by birth, and educated at Wilna. Having been compromised in the Polish revolution of 1831, he emigrated to Prussia, where he became acquainted with Humboldt, who recommended him to the Belgian Acclimatization Society, in whose service, as well as that of M. Van Houtte, he explored several parts of Central America. Returning to Europe in 1850, he made shortly afterwards another journey to Central America on his own account, from which he returned in 1853, collecting and introducing during this time many rare and new plants. In 1854 he was appointed Inspector of the Botanic Garden of Cracow, which appointment he held with credit to himself and advantage to the garden, till on the 29th of December death cut short his career. Warszewicz attained but 56 years of age. He was hard of hearing, and spoke all European languages, except Polish, most imperfectly, which was probably the reason why he has written so very little. His name has been given to genera and species, and will always be gratefully remembered.

Quekett Microscopical Club.—The monthly meeting of this club was held at University College, on June 28th, Mr. Ernest Hart, president, in the chair. A paper was read by Dr. Robert Braithwaite on "The Organization of Mosses."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ON APHYLLOSTACHYS, A NEW GENUS OF FOSSIL PLANTS OF THE CALAMITES GROUP, AND ON THE RELATIONS OF THE FOSSIL FLORA TO DARWIN'S THEORY OF TRANSMUTATION.

By Prof. H. R. Göppert.

(*Translated from the* 'Nova Acta' *of the Imperial German Academy Naturæ Curiosorum.*)

(Plate LXVIII.)

About eighteen years ago, Dr. Jugeler, of Hanover, sent me a fossil plant from the neighbourhood of Engern, which he and my colleague, Dr. F. Römer, thought probably belonged to the Lias-beds of that district. Examination convinced me that it was of great interest, but its relations to any fossil or living species appeared to me obscure, and I again and again put it aside in hopes that time would throw further light upon it. But as these hopes have not yet been realized I at last publish it, trusting that others may explain its relationship better than I am able to do.

All my investigations led to the same result, viz. that it occupies an isolated position; and this surprised me the more, seeing that it belonged to so modern a formation. It has recently engaged anew my attention, such forms having a new interest because of the discussions raised by Darwin's theory of transmutation. No one has looked at fossil plants in their relation to this theory, with the exception of Dr. Hooker, who makes a passing remark on them in the Introduction to his 'Tasmanian Flora.' He holds that, regarded from the classificatory point of view, the geological history of plants is not so favourable to the theory of progressive development as that of animals, because the earliest ascertained types are of such high and complex organization, and because there are no known fossil plants which we can certainly assume to belong to a non-existing class, or even family, and none that are ascertained to be intermediate in affinity between recent classes or families.

In another part, the absence of genuine Monocotyledons is alluded to by him, as it was previously by Brongniart and Geinitz, and shown to be not in favour of that theory. But it is evident from his dissertation that, on the whole, he regards these unfavourable points rather as

the result of our imperfect knowledge of fossil plants than as opposed to the Darwinian theory adopted by him. My publications on the 'Permian Flora' would have supplied him with ample materials for correcting his imperfect knowledge; for my somewhat comprehensive acquaintance with existing plants, justifies me in maintaining that plants like the Sigillarias, well-known even as to their fruiting organs, as well as the Calamites and Lepidodendrons, with whose anatomical structure we are well acquainted, did not belong to any now existing Natural Order. But all these matters seem to him of less importance than the proof of variation among plants, which, in this case, would be all the more telling as questions of genetic relations could not be raised. But I hold that our knowledge of fossil plants is amply sufficient to supply even now decided proofs to the contrary. With regard to the existing vegetation, I am aware that its youth as well as that of the allied diluvial flora will be brought forward. But a high importance must be accorded to those species of plants, and to the more numerous animals which have passed from the Tertiary period to our own time, and more to those plants which have existed in two formations, as in the Upper Devonian and the Lower Coal, or the Upper Coal and the Permian,—and still more to those which have existed unaltered through *three* periods, as in the case of *Neuropteris Loshii*, which ranges from the Lower Coal formation through the Upper to the Permian, and which must be regarded, without doubt, as the species which has enjoyed the longest life. If we add to this the numerous families and genera which have remained unaltered since their first appearance, so that the same characters can be used for the definition of the different species that occur in all the geological periods, it is difficult to perceive where the mutations are to be found which the different species are said to have undergone. If we also consider that in the very earliest times of the first land-flora certain groups of plants, for instance the Ferns, appeared in a degree of perfection, previous to the gradual development of which an enormously long range of time and numberless antetypes (which are entirely wanting) would be required; and that some groups became extinct at very early geological periods, leaving to subsequent periods only faint remnants or indications of their former degree of perfection (as we may say with confidence of the *Selagineæ* and *Calamariæ*), it is difficult to comprehend how so esteemed and eminent a botanist could take such

a lively interest in Darwin's theory, not even condescend to enter into a comparative examination of the fossil plants, and accuse our knowledge of them (which he himself has so much advanced) of a high degree of imperfection. I take it upon me to appear in their defence, and to point out the principal results which have already been established, and which can by no means be regarded as props of the theory of transmutation.

1. The Orders, families, genera, and species of the fossil flora were not always equal. Most of them have had a very unequal duration, and been subject to violent changes. There are but few instances of the extinction of complete Orders, and these are as yet known only to occur in the terrestrial flora of the Palæozoic period, as the *Calamiteæ*, *Annulariæ*, *Nöggerathiæ*, and *Sigillariæ;* but much more common is the disappearance of families, as of Calamites, Lepidodendron, or isolated genera, as amongst the Ferns of those founded upon fronds, *Odontopteris*, *Calipteris*, and *Dictyopteris*, and perhaps also of those founded upon stems, *Asterochlæna*, *Tubicaulis*, *Ptychopteris*, etc.

In subsequent géological periods the extinction of whole Orders of plants does not take place, scarcely even that of families, although we meet with instances in the Bunter Sandstein of the Trias, which immediately succeeds the Palæozoic period, if we regard the curious *Schizoneura* and *Æthophyllum* as a distinct family, and also the Sigillaria-like *Pleuromoia*, which is, as it were, an echo of that Order. The generic type also approaches more and more the existing, and only the Coniferous genera *Voltzia* and *Albertia*, of the Bunter Sandstein preserve characters materially differing from those of the present time. Subsequent discoveries may possibly set aside these differences, but the results just pointed out are too well established to be materially shaken, even if we should succeed in obtaining further disclosures about the numerous fruits of the Palæozoic formations.

With regard to species, we find their duration generally restricted to the greater geological periods, and only in isolated instances, occurring in both the older and newer formations or divisions. An overleaping of certain formations of the same period, or even whole periods, as is stated to be the case with the fossil animals, has as yet not come to my knowledge. From my own observations I have not found a single plant which may with certainty be shown to have passed from the Permian formation to the Trias. *Voltzia heterophylla* and *Equisetites*

columnaris (including in this last species *Calamites arenaceus*), both otherwise leading plants of the Trias, are regarded as doubtful exceptions to this generalization.

In the Palæozoic period only 5 [6] of the 55 species of the Upper Devonian flora descend to the Lower Coal formation, viz. *Sphenopteris petiolata*, *S. Devonica*, *S. refracta*, *S. disserta*, *S. imbricata*, and *Calamites transitionis*. Of the 185 species of the Lower Coal formation only 7 are found also in the Upper, viz. *Sphenopteris obtusiloba*, *Hymenophyllites quercifolius*, *Cyatheites asper*, *Schizopteris lactuca*, *Sagenaria aculeata*, *S. rugosa*, and *Neuropteris Loshii*. The last is, of all fossil plants, as already mentioned, that which has enjoyed the longest life, extending from the Lower Coal formation to the Permian. The Upper Coal flora, which has about 814 species, has 19 in common with the Permian (which contains 272), viz. *Gyromyces Ammonis*, *Annularia floribunda*, *Asterophyllites rigidus*, *Sphenopteris tridactylites*, *S. artemisiæfolia*, *Neuropteris tenuifolia*, *N. ligulata*, *Alethopteris similis*, *Cyatheites Schlotheimii*, *C. arborescens*, *C. Oreopteridis*, *C. dentatus*, *Hemitelites cibotioides*, *Pacopteris plumosa*, *Sigillaria* (and *Stigmaria*), *Cordaites principalis*, *Cyclocarpus tuberosus*, *Nöggerathia palmæformis*, and *Walchia piniformis*.

In the Flora of the Trias we find a less marked boundary towards that of the Jura than amongst its different divisions. *Equisetites columnaris* (*Calamites arenarius*) is met with both in the Bunter Sandstein and the Keuper. On the other hand, the Keuper has, in common with the lower division of the Jura period (Lias), three species (*Equisetites Münsteri*, *Tæniopteris marantacea*, and *Camptopteris Münsteriana*); the Lower Jura, or Lias, with the Middle Jura *Alethopteris Whitbiensis*, *A. Nebbensii*, *Tæniopteris vittata*, *Pterophyllum minus*, and *Nilsonia compta*; and the Middle Jura with the Wealden clay, *Cyclopteris Huttoni*.

The Flora of the Jura period is clearly separated from that of the Cretaceous formation, and this again from the Tertiary, although in the Cretaceous beds we have for the first time genuine leaf-plants, *i. e.* Dicotyledons which are not Gymnosperms.

In the Flora of the Tertiary period we have an increasing approximation to, and greater affinity with that of the present, and also frequent transition of species from one division into another, and even through all divisions to the present, as was first shown by me in 1845,

in my 'Bernstein Flora,' and as has since been confirmed by Unger and Hartig.

From all this it is evident that new species appeared and disappeared at all times, and that at no times were all the species of plants simultaneously created or simultaneously swept away.

2. A few Orders and families attain, on their first appearance, a high degree of development, and retain this down to the present time. This applies to the oldest family, the *Algæ*, for I have discovered *Florideæ* in the Silurian formation; and also to a somewhat younger Order, that of the Ferns, which even in the first terrestrial flora, attained a high development, and has retained it through all the formations up to the present time, without ever having experienced any transmutation or a period of evolution. Other Orders first appear in some isolated divisions or families, as, for instance, the *Coniferæ*, which began with the *Abietineæ*, and gradually became more complex, but as early as in the Palæozoic period appeared in such diversity of form, and consequently high internal structure, as in no subsequent period. This is most important, as, for instance, one of their peculiarities is their having compound medullary rays (instead of the simple forms which now prevail in the whole family), reminding us markedly of the Dicotyledonous type which did not appear before the Cretaceous period. But this high degree of development is confined to the *Abietineæ*; the *Coniferæ* and *Cupressineæ* of the Permian, and the *Taxineæ* and *Gnetaceæ* of the Tertiary period correspond in all peculiarities with those of the present time. An equally high development of internal structure was attained by the *Cycadeæ* (closely allied to *Coniferæ*, and also belonging to Gymnosperms), as early as the Permian formation (*i. e.* towards the close of the Palæozoic period), in the curious trunks of *Medullosa stellata*, Cotta. The structure and disposition of the woody cylinder and its medullary rays correspond generally with those of *Encephalartos*, a Cycad of the present flora, but with this great difference, that there are in the pith not only isolated vascular bundles as in *Encephalartos*, but a complete woody cylinder, having the structure of the principal cylinder enclosing them. These central cylinders repeat the structure of the whole trunk, and the organism has attained, on this account, a higher stage of development than is observed in any Cycad before or since that time. Moreover this structure is unique in the whole vegetable kingdom, as recent exa-

minations of about twenty-six families, have shown vascular bundles in the pith, but never complete woody circles. In *Paulinia* (*Sapindaceæ*) only is this peculiarity noticed, and here not in the pith, but on the outside of the woody cylinder; and yet notwithstanding the high systematic position of this genus, these woody circles are more imperfect than in our fossil plants; for in all of them, surrounded as they are by the common bark, we miss the pith, which is highly developed in all the numerous specimens (often 30–40), existing in the medullary axis of *Medullosa stellata*.

3. All these conditions, even if we were inclined to grant that new discoveries may fill up certain breaks, prove an *independent* appearance of the different organisms, and are opposed to a secular transmutation of definite forms, which would necessitate our assuming the existence of previous lower, but hitherto altogether unknown ones.

A still more positive proof of the independence of the creative type (unfavourable to transmutation or evolution) is supplied by those families and Orders of the Palæozoic period, which have representatives in the existing flora. How very simple do our *Calamariæ* appear, reduced as they are to *Equiseteæ*, in comparison to the diversified structure of *Calamites*, and our *Selagineæ*, in comparison with the Palæozoic *Lepidodendreæ*, even if we take no note of the arboreous habit of the two groups. It should be remarked also that these highly developed *Calamariæ* co-existed with Ferns, Monocotyledons, and Gymnosperms, and did not, as is often asserted, herald the appearance of these by combining characters which became afterwards separated or existed isolated in different genera.

Quite isolated are the *Sigillariæ* (of which the *Stigmariæ* are the roots), and even without any other evidence they are quite sufficient to support the dictum that certain forms were created only once in certain geological periods, without the creative power being solicitous, as Darwin everywhere assumes, to ensure their further development. Where do we find a plant of similar form or organization? It begins its existence, according to our observation, as a round knob, a few inches in size, with root-fibres exactly resembling fleshy leaves, arranged in regular spiral lines, and dividing dichotomously towards the point; the knobs or tubers gradually develope in cylindrical, afterwards forked branches, evidently intended to lead a subterranean existence in a swampy or boggy ground, at least for some time, like the rhizome of

several *Orobanches*. Soon there developes from this or that point of their rhizomatous branches, often 30 feet long, as from a *punctum vegetationis*, a large dome-shaped structure, from which rises the genuine trunk, which is 60–80 feet high, cylindrical and densely clad with grass-like, narrow leaves, and has verticillate branches. Its inner structure does not at all agree with that of the *Lycopodiaceæ*, as might be supposed from their fruit agreeing somewhat with that of that family. On the contrary, its woody cylinder is furnished with medullary rays and radiating scalariform vessels, reminding us of Ferns and Gymnosperms, while only the parenchyma of the bark and the vascular bundles branching off from it to the leaves show a relationship with the *Lycopodiaceæ*. And the Sigillarias occurred in crowded, compact masses, like most of the forest-forming trees of the present day, for they make up the bulk of the coal, which is found only in any quantity in places where the shales and sandstones are full of the remains of this genus, and only in small quantities where, as in the Lower Coal and the Permian formation, they are rare. We may assert then, with confidence, that there never has existed on earth a family possessing so many peculiarities, and at the same time having such an extensive range, as the *Sigillariæ;* nor has there ever been any analogous form, with the exception of *Pleuromoia*, of the Bunter Sandstein, a formation which, like those of the Palæozoic period, does possess types for which we have hitherto sought in vain for analogous forms.

4. A gradual progression from the lower to the higher types, but only in a general way, cannot be denied, but it has only taken place in the same class or in the same Order, without affecting the retrograde movements which have occurred in certain families of the same class or Order.

Thus the vegetation of our globe commenced with *Algæ*, but one would make a mistake in supposing that the lowest forms appeared first and isolated. This is by no means the case, as I showed some years ago in my 'Uebergangs-flora,' where I pointed out the coexistence of the lowest unicellular *Algæ*, as the Caulerpas and Confervas, with the higher *Florideæ*, and even a *Callithamnion*. Something similar is observed among fishes, which first appear in the Devonian rocks, not in species belonging to the lowest groups, but with the sharks and ganoids.

In the Natural System the *Fungi* are of a lower grade than the

Algæ, but, as terrestrial plants, their appearance could not be looked for until the terrestrial flora was ushered in. And that is the case, for we meet with them on Ferns of the Coal period. The other cellular plants are entirely wanting in Palæozoic strata; they make their appearance only in the Tertiary period, and perhaps have not existed earlier.

In a strict succession according to the theory of progressive development, there is here a serious break-down; nevertheless we may assert that vegetation on our globe commenced with the lowest form of cellular plants.

The higher Cryptogams, as the *Selagineæ* and *Calamariæ*, now appear in a state of development and perfection that is not reached in any subsequent period; but at the same time there also are associated with them such herbaceous forms as we have at the present day. There is no transmutation from one species to the other in this large Order. The existence of Monocotyledons in the Palæozoic period cannot be doubted, in my opinion, judging from a flower-bud resembling that of some recent *Scitamineæ*. If it really did belong to *Nöggerathia*, as is most probable, then the Monocotyledons have furnished their full share towards the formation of coal. The curiously-formed *Calamites* and *Sigillariæ*, without any preparatory type, and not developing into any higher,—for they stand and fall with the younger division of the Palæozoic period,—occur together with Gymnosperms (*Coniferæ* and *Cycadeæ*), which display a greater perfection than in any subsequent period. All the lower stages of the vegetable kingdom,—cellular plants, higher Cryptogams, Monocotyledons, and even Gymnosperms,—already existed in the Palæozoic period; but the appearance of genuine Dicotyledons has still to be discovered. The Trias, which succeeds, has, in the Bunter Sandstein, a number of forms not represented in the present flora, but they belong to already existing families, and there is a gradual replacing of extinct Orders and families by a superabundance of Ferns and *Cycadeæ*. The same remark applies to the whole Jura formation, with the exception of the single genus which I shall presently describe. In the Cretaceous period, however, genuine leaf-Dicotyledons appear, and there is from that time a constantly increasing approximation towards the flora of the present time; and this proceeds until, in the Tertiary period, the balance is turned, and the living forms predominate.

If, as I believe, nothing can be said against the correctness of these views,—based, as they are, not upon conjecture or mere examination of external appearances (most deceptive in fossil plants), but upon internal structural differences,—one is at a loss to comprehend how all these very different organic forms can have descended in a direct line from each other, and, as a necessary consequence of such a theory, from one primordial form; or how they can have developed into the present diversified forms of life by undergoing a constant mutation of hereditary peculiarities, by individual variations, by struggles for existence, and by natural selection,—the principal dogmas of the Darwinian theory. Under these circumstances, it will be granted that the doctrine of transmutation receives no more support from the fossil flora than it does (as Reuss has shown most convincingly) from the fossil fauna.

I now add the description of the plant which has led to the above remarks:—

APHYLLOSTACHYS, *mihi* (Ordo *Calamariæ*, Endl.). Caulis fructigerus articulatus, inter articulos striatus, fortasse angulatus. Fructificatio verticillato-spicata, aphylla. Spicæ suboctonæ, lato-lineares, obtusatæ, pedunculatæ, internodiis paulo breviores, e sedecim circiter verticillis compositæ, pedunculis basi in strias longitudinales parallelas decurrentibus. Capsulæ oblongo-quadratæ, in series approximatas horizontales (haud alternantes) dispositæ, cum iisdem serierum infra et supra positarum alternantes, nunc bracteis uti videtur haud plane destitutæ. Species unica: *Aphyllostachys Jugleriana*.

Locality: Enger, in Hanover. From a bed, probably belonging to the Lias.

Fig. 1 represents the fossil of the natural size. It consists of a series of fruit-spikes compressed and imperfectly preserved, and arranged in verticils. The rapidly decreasing size of the spikes in an upward direction seems to indicate that this is only the upper portion of the complete inflorescence. On the lower portion of the slab at *a* are to be seen traces of the spikes of a lower verticil, and on the upper portion at *b* the bases of the spikes of an upper verticil can be detected. Each verticil contains 8 or 9 spikes, which are linear-cylindrical and somewhat rounded towards the apex, 5 to 6 lines long, and $1\frac{1}{2}$ to 2 lines broad, narrowed below into a broadish, longitudinally-striated, evidently somewhat compressed, short peduncle. (Fig. 1, *c*.)

Without any apparent node, these peduncles appear to pass down the internode,—but they were probably subtended by bracts,—and give the appearance of parallel striation to the axis, which was perhaps fluted. The base of the lower verticil (*e*) is hid by the stony matrix. There are no leaves at the base of the spikes. I formerly thought the fruit-capsules were also without them, and so named the fossil *Aphyllostachys*, but now I believe they were present, as shown in the magnified view of the lower whorl in Fig. 2. The spikes consist of from 12 to 16 verticils, of quadrangular, densely-packed capsules, or rather sporangia if the plant was a cryptogam, arranged apparently not in vertical, but alternating series. The capsules in the specimen were empty when it became fossilized. There appears to have been 16 capsules in each verticil, for in the upper exposed surface 6 to 8 may be counted. There are no certain indications of the nature of the seeds of fruit-capsules, as may be seen from Fig. 2, which is considerably magnified, and is a representation of the whole fossil except the portion of the stalk below *e* in Fig. 1. This enlarged figure, however, does not show much more than Fig. 1, and we have consequently left out the details except in the lowest verticil. The bracts, however, at the base of the spikes (if, indeed, they really exist) are more obvious at *c*. Fig. 2, *b*, shows the base of the spikes; *c*, their peduncles; *d*, the place where the peduncles pass into the longitudinal striæ of the internodes; *e*, spikes, showing the fruit-capsules arranged in horizontal and probably alternating series.

One is involuntarily reminded, on looking at this plant, of the fruit-spikes of several Coal-plants of the *Calamariæ* family, such as *Sphenophyllum Schlotheimii*, Brongn. (Germar Petrific. Wettin. fasc. ii. tab. vi. fig. 1–3), or still more of the rarer and less known *Volkmannia sessilis*, Presl (Verh. Böhmischen Museums, 16, Prag, 1838, p. 28, tab. ii. fig. 1), with its similarly-arranged fruits. But our plant differs from both, and all others, by the absence of leaves at the base of the whorl of spikes, and by its closely-crowded square fruits; so that, even if our plant should turn out to belong to the Upper Coal formations, it would always constitute a new genus. In vain have I looked for a proper analogous form in the existing flora, and fifteen years ago, as now, I was never able to hit upon anything better than the *Casuarineæ;* compare the fruits of *Casuarina distyla*, Vent. Though there may be a certain resemblance in the nature of the stem, the fruit-spikes

differ in their form, and in the quincuncial position of the fruits, whilst in our plant the verticillate arrangement prevails. *Casuarina prisca*, from an unknown formation of New Holland, described and figured by Miquel, exhibits younger female and male flowers, and does not offer any points of correspondence to our plant, nor does *Casuarina Heidingeri*, Ettingsh., from the older Tertiary beds of Dalmatia.

Our species thus belongs to forms which remind us of older extinct ones, especially to *Calamariæ*, inclusive of the *Asterophyllites* and *Sphenophylla* of the Coal formation, and perhaps even *Æthophyllum speciosum* of the Bunter Sandstein. From my present stand-point, I hold that the creative power displayed itself in such forms even beyond the Trias up to the first or lower division of the Jura formation,—a result which is sufficiently notable to claim for our plant a certain importance amongst fossils, though we may be somewhat ignorant of its exact origin. I place it unhesitatingly in the Order *Calamariæ*, near *Annularia* and *Sphenophyllum*.

Explanation of Plate LXVIII.

Fig. 1. *Aphyllostachys Jugleriana*, Göpp.,—*natural size.* *a*, Portion of a verticil that has been broken off; *b*, base of an upper verticil broken off; *d*, indications of the passing down of the peduncles into the internodes; *e*, a portion of the stony matrix covering the fossil.

Fig. 2. *A. Jugleriana*, Göpp.,—*magnified.* *a*, The portion of the stony matrix covering the fossil; *b*, the peduncles; *c*, the bracts; *d*, the junction of the peduncles to the axis; *e*, the spikes, showing the arrangement of the capsules.

Fig. 3. Fragment of the fruit of *Sphenophyllum Schlotheimii*, Germ.

Fig. 4. Fragment of *Volkmannia sessilis*, Presl.

OFFICIAL REPORT ON THE BOTANICAL DEPARTMENT OF THE BRITISH MUSEUM.

By J. J. Bennett, Esq., F.R.S., etc.

The principal business of the Department, during the past year, has consisted in the re-arrangement, with very large additions, of the general collection of *Algæ*, of the extensive Order of *Euphorbiaceæ*, of the *Lycopodiaceæ*, *Nymphæaceæ*, and of a portion of the *Compositæ*.

In the naming, arranging, and laying into the general Herbarium of the remainder of Mr. Charles Wright's extensive collections made in

Cuba and New Mexico; of the extensive collection formed by the late Mr. David Douglas, in North-Western America and California; of a large number of Ferns, collected in Ceylon by Mr. Thwaites; in Venezuela, by M. Moritz; and in English gardens by Mr. John Smith; of *Piperaceæ*, from various collections; of Dr. Wallich's collection of Nepalese Oaks; of numerous plants from Brazil and from the Arctic Regions; of Palms from various regions; of numerous European collections; and of several important collections of Cryptogamic plants, including American and other Mosses.

In the examination and arrangement of the valuable collection of specimens of *Cycadeæ*, presented by Mr. James Yates; of a large collection of plants of the Tyrol; of the very extensive collection of Ferns recently purchased from Mr. John Smith, of Kew; of the fruits of *Cupuliferæ* and *Coniferæ*, in the general fruit collection; of a portion of the collection of recent Woods in the exhibition rooms; of the fossil cones and woods belonging to the carboniferous period; and of the late Dr. Greville's very extensive and important collection of *Diatomaceæ*.

And in the naming, arranging, and laying into the British Herbarium of numerous specimens from various collectors.

The following are the principal additions made to the botanical collections during the past year, by purchase or donation:—

A large and highly interesting collection of specimens of the Order *Cycadeæ*, consisting of sections of stems, fronds, male and female cones in various stages of growth, separate parts of fructification, etc., together with numerous specimens of Woods, recent and fossil, and other vegetable productions, presented by Mr. James Yates.

The remaining portion (upwards of 2000 species) of Mr. John Smith's Herbarium, chiefly of garden plants.

A very extensive and valuable collection of Ferns (containing upwards of 10,000 specimens), formed by Mr. John Smith, of Kew.

100 species of *Compositæ*, forming fasc. 2, suppl. of Dr. C. H. Schultz's 'Cichoraceotheca.'

49 British species and varieties of the genus *Rubus*; presented by the Rev. A. Bloxam.

370 species of Lichens, constituting Leighton's 'Lichenes Britannici Exsiccati.'

400 species, forming Mademoiselle Liberts' 'Plantæ Cryptogamicæ.'

600 species of German plants, being cent. 1–6 of Dr. F. Schultz's 'Herbarium Normale.'

850 species of plants of the Tyrol, collected by Rupert Huter.

15 species of Woods from the neighbourhood of Mentone; presented by Mr. Moggridge.

113 species of plants of Ceylon (in continuation); collected by Mr. Thwaites.

475 species of plants of the Island of Formosa; collected by the late Mr. Oldham.

112 species of plants of Old Calabar; collected by Mr. Milne.

31 species of Australian Algæ.

536 species of American Mosses, forming the new edition of Sullivant and Lesquereux's 'Musci Americani Exsiccati.'

593 species of South American plants, forming part (in continuation) of Mr. Spruce's 'Plantæ Exsiccatæ Æquinoctiales.'

404 species of Lichens and allied tribes from the river Amazon and the Andes of South America, collected by Mr. Spruce.

Upwards of 5000 microscopic slides of *Diatomaceæ*, together with the Catalogue and notes relating to them, forming the entire collection of the late Dr. Greville and the late Dr. Gregory.

ON *CALAMAGROSTIS LANGSDORFFII*, *Trin.*, AND *C. PHRAGMITOIDES*, *Hartm.*

By Henry F. Hance, Ph.D., etc.

In a valuable review of the North American *Calamagrostides* belonging to the section *Deyeuxia* (Proc. Amer. Acad., Oct. 1862), Professor A. Gray remarks on the great resemblance in aspect, already noted by Grisebach (Ledeb. Fl. Ross. iv. 430), between *C. Langsdorffii*, Trin., and *C. phragmitoides*, Hartm., and he refers Andersson's var. *elata* of the latter species to *C. Langsdorffii*, stating that the rudimentary flower is evident. I have received from the Petersburg herbarium a grass, labelled *C. purpurea*, Trinius (which species that author latterly, and I believe all writers now, have regarded as a mere form of *C. Langsdorffii*), gathered in 1859 by M. Maximowicz at the mouth of the river Dseja, in Amuria. In this there is certainly no rudiment

whatever of an upper floret; and not only do the flowers precisely accord with Andersson's analytical figures of *C. phragmitoides* (Gram. Scandin. t. ix. f. 97), but they are absolutely undistinguishable under the microscope from those of the plant distributed under that name (Fl. Lapp. Exs. n. 279) by Professor Andersson himself, to whom I am indebted for a specimen, and the two plants agree perfectly in all respects. Hence this species must be added to the flora of North-Eastern Asia. But the further question arises whether these two reputed species are really distinct. It seems to have been overlooked that Trinius originally described his *C. purpurea* as "processu nullo," and *C. Langsdorffii* as "processu longe barbato" (Gram. Uni- et Sesquifl. 225, 229), although Grisebach (l. c.) attributes to each a "rudimentum minutum, pilis elongatis terminatum." Fries says (Summa Veg. Scand. 239), "Notæ vulgo autem, etiam ad sectiones discernendas citatæ (v. c. situs aristæ, rudimentum secundi floris) passim occidentales;" and Andersson (*op. cit.* 80), "Friesius aperte demonstravit præsentiam v. defectum flosculi secundi in hoc genere minimi esse momenti." Moreover, Maximowicz has described (Prim. Fl. Amur. 324) a viviparous variety of *C. purpurea*, destitute of a rudimentary floret. It would be very desirable to ascertain whether the presence or absence of this organ is really of even specific value in this intricate and protean genus. Unless the nomenclature adopted in labelling Drs. Hooker and Thomson's 'Indian Grasses,' and that employed in the enumeration of those of the Linnean herbarium, are to be taken as proofs of Colonel Munro's matured views, I know of no eminent living agrostographer who now regards *Deyeuxia* as a genus, except Parlatore, who still distinguishes it (Fl. Ital. i. 211) by the rudimentary upper floret and geniculate awn. But both Fries and Andersson deny that the two characters constantly coexist; and, in fact, the straight-awned *C. lanceolata*, Roth, is recorded as having sometimes a rudimentary flower. *C. stricta*, Spr., has a straight awn and an upper floret; whilst in *C. Lapponica*, Wahl., the awn is, as it were, intermediate between the two sections. Dr. Hooker has recently (Handb. N. Zeal. Fl. 329) reduced the species of the southern hemisphere to *Agrostis*, a view which had been previously taken by Trinius in his 'Agrostidea.' Of these, some, as *A. Billardieri* and *A. æmula*, have a twisted awn; others, as *A. Chamissonis* and *A. setifolia*, a rigid one. The truth is, that the genera of *Agrostideæ* have been unreasonably

multiplied; and a thorough revision of the tribe on broad and sound principles, like those followed in the 'Genera Plantarum,' must inevitably lead to extensive reductions: *Calamagrostis*, for example, is absolutely distinguishable from *Agrostis* by nothing except the length of the hairs embracing the floret; and great discordance exists amongst botanists as to the limits between those genera, *Lachnagrostis* (when admitted), and even *Gastridium*.

DESCRIPTION OF A NEW SINGHALESE SEDGE.

By H. F. Hance, Ph.D., etc.

Carex Thwaitesii, n. sp.; radicibus fibrosis; culmis 1½–2-pedalibus per totam longitudinem foliosis compressis cum vaginis hirto-scabridis; foliis linearibus exquisite attenuatis 7–9 poll. longis 2½ lin. latis scabris, inferioribus deorsum in vaginas subscariosas sensim diminutis, supremis culmum paulo superantibus; ligulis conspicuis scariosis oblongis productis lateribus sursum protractis et foliorum basi liberæ adnatis; spicis 3–5, terminali mascula cylindrica semipollicari, squamis pallide brunneis ovatis acutis muticis, reliquis femineis ¾–1-pollicaribus, omnibus breviter pedunculatis; bracteis foliis conformibus culmo longioribus; perigyniis elliptico-trigonis fuscis densissime cinereo-hirto-tomentosis in rostrum conspicuum iis tertio breviorem ore bicuspidato productis, squama pallide brunnea ovata breviter cuspidata duplo longioribus; achænio elliptico-triquetro 1½ lin. longo pallide brunneo nitido oculo armato subtilissime puncticulato basi stylina haud coronato.

In ditionibus Maturatta et Hewahette dictis ins. Zeylaniæ, alt. 4–5000 ped. (Thwaites!, n. 2750).—*C. breviculmis*, Thw. Enum. Pl. Zeylaniæ, p. 356, non R. Br.

When naming the above Sedge *C. breviculmis*, Dr. Thwaites had seen no specimens of the Australian plant, from which it is surely more distinct than that and *C. Royleana*, N. ab E., *inter se*. The totally different aspect, robuster habit, leafy stem, larger and thicker spikes, different-coloured squamæ, and larger, fuscous, densely hairy, long-beaked perigynia, seem to me abundant and indubitable marks of distinction.

REVISION OF THE NATURAL ORDER HEDERACEÆ.

By Berthold Seemann, Ph.D., F.L.S.

(*Continued from Vol. IV. p. 353.*)

Cheirodendron, Nutt. mss. in Herb. Mus. Brit. (gen. nov.). Pedicelli articulati, calyculati, calyculo dentato v. subfimbriato. Flores polygami. Calycis tubo obpyramidato 3- v. 4–5-angulato, limbo truncato minute 5-dentato. Petala 5, ovato-triangularia, libera, æstivatione valvata. Stamina 5; antheræ 2-loculares. Ovarium 5- v. 4–3-loculare, loculis 1-ovulatis. Stigmata 5 v. abortu 4 v. 3, stylopodio imposita. Drupa carnosa, 3–5-angularis, 3–5-pyrena. Albumen corneum, æquabile.—Arbores Hawaienses et Chilensis, inermes, foliis exstipulatis oppositis v. alternis, digitato-3-5-foliolatis, foliolis ovatis v. ovalibus serratis v. subintegerrimis; umbellis laxe paniculatis.—*Hederæ Panacis* et *Araliæ* sp. auct.

Closely allied to the genus *Pseudopanax*, C. Koch, from which it differs by its denticulate calyculus and stigmas seated on a stylopodium. *Sciadophyllum Gayanum*, Dcne. et Planch. Rev. Hort. 1854 (nomen solum), is probably a synonym of one of the Chilian species of *Cheirodendron*.

1. *C. Gaudichaudii*, Seem.—*Aralia trigyna*, Gaud. Bot. Freyc. Voy. p. 474, t. 98. *Panax (?) Gaudichaudii*, De Cand. Prodr. iv. p. 253; Hook. et Arn. Bot. Beech. p. 84. *Hedera Gaudichaudii*, A. Gray, Bot. Wilkes, p. 719, t. 90.—Hawaiian Islands (D. Nelson! Menzies! Nuttall! Macrae!).

Var. β; foliolis sæpius 3 subovatis vix denticulatis seu integerrimis. —*Panax (?) ovatum*, Hook. et Arn. Bot. Beech. p. 84.—Hawaiian Islands (Nuttall!).

2. *C. platyphyllum*, Seem.—*Panax (?) platyphylla*, Hook. et Arn. Bot. Beech. p. 84. *Hedera platyphylla*, A. Gray, Bot. Wilkes, p. 720. t. 91.—Hawaiian Islands (Lay and Collie!).

3. *C. læteviréns*, Seem.; foliolis elongatis cuspidatis inciso-serratis. —*Aralia læteviréns*, Gay, Fl. Chil. iii. p. 151.—Woods of Valdivia, Chili, as far north as the river Maule (Gay!, Dombey!). Termed "Sauce" by the Chilians, and used by them as a sudorific.

4. *C. Valdiviense*, Seem.; foliolis ovatis acuminatis subintegerrimis v. obscure serratis.—*Aralia Valdiviensis*, Gay, Fl. Chil. iii. p. 152.

Sciadophyllum racemiforme, Miq. in Herb. Hook. *Aralia paniculata*, Philippi. Nomen vernaculum Chilense, "Saluco falso," teste Philippi. "Arbor 20 ped." Philippi Plant. Chil. n. 236.—Island of Chiloe (Capt. King!); Straits of Magellan (Whinnie, Capt. King!); Valdivia, outskirts of woods. (Bridges! n. 78, ex parte; Lechler! n. 1417 et 1302; Harvey! Gay!)

5. *C. Samoense*, Seem.—*Paratropia Samoensis*, A. Gray, Bot. Wilkes, p. 722.—Samoan Islands (U. St. Expl. Exped.!)

HORSFIELDIA. Pedicelli inarticulati, ecalyculati. Flores polygami. Calyx tubo ovato, limbo obsolete denticulato. Petala 5, ovata, acuta, libera, æstivatione valvata. Stamina 5; filamenta elongata, filiformia; antheræ subrotundæ. Ovarium 2-loculare, loculis 1-ovulatis. Ovula pendula. Styli 2, omnino liberi, divaricati. Drupa didymo-compressa, 2-pyrena, pyrenis 3-costatis. Semina oblonga. Albumen æquabile. Embryo minutissimus.—Frutices magni, aculeati, Americæ boreal.-occid., Japoniæ et insulæ Javæ; foliis exstipulatis alternis peltatis vel palmatis, petiolis spinosis; umbellis subsessilibus vel pedunculatis, basi bracteolatis, in racemos v. spicas simplices vel compositas dispositis.—*Horsfieldia*, Bl. Bijdr. p. 885; Brown et Bennett, Pl. Jav. Rar. p. 123. t. 26. *Schubertia*, Bl. l. c. *Echinopanax*, Dcne. et Planch. in Rev. Horticol. 1854, p. 105. *Panacis* sp. auct.

I cannot find any structural difference of generic importance between *Horsfieldia aculeata*, Bl., and *Echinopanax horrida* (*Panax horrida*, Smith), and therefore do not hesitate to unite them. The two form a very natural genus, with a distinct habit.

1. *H. aculeata;* foliis peltatis utrinque inermibus subtus dense stellato-tomentosis; umbellis subsessilibus basi pluri-bracteatis; calyce hispido; fructu paleaceo-setoso.—*H. aculeata*, Bl. Bijdr. p. 885; Brown et Bennett, l. c. p. 123. t. 25.—Java (Horsfield! in Mus. Brit.).

2. *H. horrida;* foliis palmatis utrinque aculeatis, subtus ad costas nervisque pilis crispis sparsis instructis; umbellis pedunculatis, ebracteatis; calyce fructuque inermi glabro.—*Horsfieldia horrida*, Seem. mss. *Panax horridum*, Smith in Rees' Cycl. n. 10; De Cand. Prodr. iv. p. 252; Hook. Fl. Bor. Am. i. p. 273. t. 98; Torr. et Gray, Fl. N. Amer. i. p. 648. *Aralia erinacea*, Hook. in Brewst. Edinb. Journ. 1827, p. 64; De Cand. Prodr. iv. p. 259. *Echinopanax horrida*, Dcne. et Planch. Rev. Hort. 1854, p. 105.—North-west America

(Menzies! Capt. Portlock! in Mus. Brit.), Wahlanat (Nuttall! in Mus. Brit.); Japan (C. Wright! Herb. Kew!).

There is a good illustration of the mode of growth and habit of this plant (so great an impediment to travellers in the woods of north-west America) in my translation of Kitlitz's 'Twenty-four Views of the Islands and Vegetation of the Pacific,' plate ii. fig. $7\frac{f}{g}$ and $2/3\,\frac{f}{g}$.

ACANTHOPANAX, Seem. mss. Pedicelli inarticulati, ecalyculati. Flores ecalyculati. Calyx minute 5-dentatus. Petala 5, 1-nervia, libera, valvata. Stamina petalorum numero iisque alterna; antheræ ovatæ. Styli 2, basi connati, apice divaricati. Ovarium 2-loculare, loculis 1-ovulatis. Fructus didymo-compressus, 2-locularis. Albumen æquabile.—Arbusculæ v. frutices aculeati, Indiæ or., Chinæ, et Japoniæ, foliis digitatim 3–5-foliolatis, foliolis serratis, stipulis axillaribus aculeatis recurvis, umbellis globosis solitariis v. paniculatis.—*Acanthopanax*, Seem. mss. *Panax* subg. *Acanthopanax*, Dcne. et Planch. Rev. Hort. 1854, p. 105. *Kalopanacis* sp., Miq. *Plectronia*, Lour. Fl. Cochin.

Folia 3-foliolata	*A. aculeatum.*
Folia 5-foliolata.	
Petioli inermes . . .	*A. spinosum.* *A. divaricatum.*
Petioli armati	*A. sepium.* *A. sessiliflorum.*

1. *A. aculeatum*, Seem. *Panax aculeatum*, Ait. Kew. iii. p. 448; De Cand. Prod. iv. p. 252; Jacq. Coll. iv. p. 175; Icon. Rar. t. 634.—*Zanthoxylon trifoliatum*, Linn. Spec. 1455; Lam. Dict. ii. p. 40. *Plectronia Chinensis*, Lour. Fl. Cochinch. i. p. 201. *Panax Loureirianum*, De Cand. l. c. p. 252. *Aralia trifoliata*, Meyen, Reise, ii. p. 332, nomen, teste C. Koch, Wochenschrift, 1859, p. 366.—Southern China, about Canton and Macao (Seemann! n. 2457; Millett! in Herb. Hook.; Sir G. Staunton! Robertson! Bradley; Lord Macartney! in Mus. Brit.), Assam plains (Jenkins in Herb. Hook.), Khassia (Griffith! in Herb. Hook.); East Indies (Wallich!, n. 4926), Assam (Griffith!, n. 787 in Mus. Brit.), Amoy (Herb. Bth.).

2. *A. spinosum*, Miq. Ann. Lugd.-Bat. i. p. 10.—*Panax spinosa*, Linn. fil. Suppl. 441; Lam. Dict. ii. p. 715. *Aralia pentaphylla*, Thunb. Fl. Jap. 128; De Cand. Prodr. iv. p. 259.—Japan (Thunberg! in Mus. Brit.; Wright! in Herb. Hook.). Thunberg's specimen at the British Museum has only 2, not 5, styles.

3. *A. sepium*, Seem.; arbuscula; ramis patentibus aculeatis, aculeis recurvis; foliis 3–5-foliolatis, foliolis ellipticis acuminatis in petiolum attenuatis, dentatis glabris, petiolis aculeatis; umbellis globosis terminalibus, solitariis v. paniculatis; pedicellis elongatis; calyce ecalyculato 5-dentato; petalis 5, 1-nerviis, liberis; stylis 2, apice divaricatis, basi connatis; fructu didymo-compresso, 2-loculari.—"Small dull green tree or bush, with dense patent branches, growing in hedges." Hook. fil. in Sched. Herb. Kew.—Nurtung (J. D. Hooker!), Baga Panee and Joowyn, E. Indies (J. D. Hooker!).

4. *A. divaricatum*, Seem.—*Panax divaricatum*, Sieb. et Zucc. Abhand. Bair. Akad. iv. 2. p. 198; Walp. Ann. i. p. 981. *Kalopanax divaricatum*, Miq. Ann. Lugd.-Bat. i. p. 17.—Japan (Siebold! in Herb. Benth.).

5. *A. sessiliflorum*, Seem.—*Panax sessiliflorum*, Rupr. et Maxim. Fl. Amur. p. 131; Amur, Regel, Gartenflora, 1862, t. 369.—Amur (Maximowicz), Manchuria (Wilford!), Northern China (Fortune? Fischer). Stem and petioles armed.

Heteropanax, Seem. Fl. Vitien. p. 114, in adnot. Pedicelli inarticulati. Flores ecalyculati, hermaphroditi. Calyx tubo obconico, limbo minute 5-dentato. Petala 5, ovata, 1-nervia, æstivatione valvata. Stamina 5. Ovarium 2-loculare, loculis 1-valvatis. Styli 2, liberi, demum divaricati. Drupa exsucca, didyma-compressa, 2-pyrena. Albumen ruminatum.—Arbuscula inermis Indiæ orientalis, foliis alternis simpliciter impari- v. supra decomposite pinnatis, foliolis petiolulatis ovatis acuminatis integerrimis, umbellis paucifloris paniculatis, pedunculis pedicellis calycibusque stellato-tomentosis, floribus odoratis. —*Panacis* sp. auct. Species unica:

1. *H. fragrans*, Seem. l. c. *Panax fragrans*, Roxb. Cat. Calc. 21; De Cand. Prodr. vol. iv. p. 254, excl. syn. Don.—Bootan (Griffith! n. 2073), Kumaon (Strachey et Winterbottom!), Sikkim, 2–4000 feet (Hooker fil. et Thomson!), Khasia (Hooker fil. et Thomson!), Calcutta Bot. Garden (Wallich! n. 4929 *b*), Assam plains (Jenkins!).

Very variable in foliage, some leaves being scarcely a foot long, others exceeding 4–5 feet in length, with petioles 2 feet and more. Don's *Hedera fragrans*, referred doubtfully to this species by De Candolle, is *Pentapanax Leschenaultii*, Seem., a common Nepal plant.

s 2

PLANTÆ NONNULLÆ NOVÆ INDIÆ ORIENTALIS.

Auctore S. Kurz.

1. *Clematis floribunda*, Kurz; dense fulvo-tomentosa; folia pinnatisecta; foliola ovata, integra; flores umbellato-cymosi, minores.—Planta tota tomentosa, ramis teretiusculis sulcatis. Foliola $1\frac{1}{2}$–2 poll. longa, pollicem circiter lata, mucronata, brevissime petiolulata, coriacea. Pedunculi oppositi, axillares, sæpius foliolo orbiculari sustenti, stricti, 1–$1\frac{1}{2}$ poll. longi. Pedicelli semipollicares, stricti. Flores magnitudine *Clematidis gratæ*; sepala extus fulvescente tomentosa; filamenta linearia, glabra.—Pegu.—Species distinctissima, indumento *Cl. grewiæfloræ* gaudens, in vicinitate *Cl. gratæ* inserenda.

2. *Sedum Tæschkei*, Kurz; annua; folia spatulato-oblonga, acuta, sæpius rosulata; flores magni, aurei, solitarii.—Annua, ramis simplicibus fastigiatis, v. basi ramosa, 4–5-pollicaris v. pumila. Folia carnosa, spatulato-oblonga, acuta, inferiora sæpius dense rosulata; fol. caulina sparsa, minora, angustiora v. etiam in ramorum apicibus conferta, radicalibus consimilia. Flores in ramis solitarii v. in speciminibus pygmæis quasi conferti, pro planta magni ($\frac{1}{2}$ poll. fere longi). Calycis laciniæ carnosæ, virides, foliis subconformes et iisdem sæpius majores, 3–4 lin. longæ. Petala aurea, calyce fere duplo longiora, lanceolata, obtusiuscula. Stamina ovariis paullulo longiora, petalorum mediam partem haud attingentia.—Lahul Tibetiæ occidentalis (Rev. — Tæschke!).—Species grandiflora inter Seda Indica, *S. trullipetalo*, H. f. et Th., arcte affinis.

3. *Astilbe Stoliczkai*, Kurz; sparse ferrugineo-pilosa; folia caulina cordato-ovata, duplicato-serrata, longiuscule petiolata; sepala oblonga, obtusa.—Plantæ pars superior florens atque fruticans tantum exstat, sed foliis simplicibus ab omnibus congeneribus jam tuto distinguenda. Habitus et inflorescentia omnino *Ast. rivularis*, flores autem paullo majores.—Himalaya bor. occid. prop. Nargkanda (Dr. Stoliczka!).

4. *Bupleurum jucundum*, Kurz; folia caulina ovato-oblonga, amplexicaulia; umbella umbellulæque nudæ, v. prior foliolo nunc arcte nunc remote sustenta.—Annua, caulibus erectis eleganter striatis teretibus. Folia caulina 3–4 poll. longa, 2 poll. lata, basibus rotundatis sese obtegentibus, mucronata, læte viridia. Flores lutei. Umbellularum radii 6–7, sæpius cum centrali sessili.—Lahul Tibetiæ oc-

cidentalis (Rev. — Tæschke!). Absentiâ involucellarum a *Bupl. longifolio*, L., cui arctissime affine, statim distinguitur.

5. *Gentiana* (§ *Amarella*) *Tæschkei*, Kurz; caulis gracilis, strictus; folia ima spatulato-linearia, glabra, superiora lineari-lanceolata, acuminata, sessilia. Flores violacei. Calycis lobi lanceolati corollæ tubo cylindrico paullo breviores. Corollæ lobi oblongi, acutiusculi. Capsula subsessilis, elliptica, stylo longiusculo coronata.—Lahul Tibetiæ occidentalis (Rev. — Tæschke!). *Gentianæ acutæ*, Mich., habitu valde accedit.*

6. *Uncaria pteropoda*, Miq.; rami sulcato-tetragoni, cinerascenti-brunnei, glabri; folia ovato-rotundata, obtuse apiculata, basi rotundatâ in petiolum brevem alato-decurrentia, integerrima, glabra, subtus pruinosa, nervis 8–9 utrinque evanidis eleganter percursa, venulis tenuissimis transverse reticulata. Capitula in unguibus solitariis v. geminis oppositifoliis compressis crassis terminalia, brevi pedunculata, multiflora. Calyces cinereo-sericei. Corollæ tubus gracilis.—Singapore (Dr. T. Anderson!).—Planta nostra cum diagnosi cl. Miquelii nimis brevi bene congruit.

AN UNDESCRIBED SENECIO FROM SOUTH AFRICA.

By Dr. F. Mueller, F.R.S.

In a communication from Peter M'Owan, Esq., Principal of Shaw College, Grahamstown, I have been desired to give an opinion on the specific validity of a new species of *Senecio*, discovered by that learned and ardent investigator of South African plants in Algoa Bay. I entered on my task with all the more pleasure, not only because the museum of Melbourne is extremely rich in plants from extratropical Africa, for comparison, but because I was anxious to promote in any way within my power the researches of a gentleman who already exercises important bearings on the elucidation of the plants of the Capeland, and who, moreover, has commenced to add largely to the

* "Apparently an undescribed species of the *Amarella* section, where, on account of the hair-crown being wanting, it will have to be ranged near *G. Moorcroftiana*, Wall., from which it differs by its smaller flowers, its acute lobes of corolla, and its calyx, making it allied to *G. Germanica*." (Professor Grisebach's Letter to Editor of 'Journal of Botany,' dated July 20, 1867.)

South African collections in possession of my institution, from the German naturalists and travellers Ecklon, Zeyher, Drege, Pappe, and Gueinzius.

Senecio is not merely more widely distributed over the globe than any other existing genus, from the polar to the equinoctial regions of both hemispheres (though almost absent in North Australia), but it embraces more species than any other,—nearly a thousand being on record, some, however, but ill-defined. The genus almost as rich in species, and almost as extensively diffused, is *Solanum*, and then seemingly follow *Panicum*, *Carex*, and *Euphorbia*, though in Australia *Acacia* largely surpasses all others. The species of *Senecio*, as representatives from almost every part of the globe, become thus of the greatest possible interest, and are certain to be always among the first which come under the notice of any phytographical observer. The Groundsels, I may remark, though generally of the more humble forms of vegetation, present, in a recently discovered species from the Chatham Islands (*Senecio Huntii:* 'Vegetation of the Chatham Islands,' sketched by F. M., p. 23, plate 3); and in the Victorian and Tasmanian *S. Bedfordii* (F. M., Report, 1858, 26) fair-sized trees, perhaps the only truly arborescent species of the globe.

In transmitting the plant to which this has special reference, the discoverer justly observes "its nearest affinity to be with *Senecio paucifolius*, from which, however, it abundantly differs in its peltate leaves. The leaf is very like a frequent form of *S. oxyrifolius*, but that plant has discoid capitula and a corymbose-paniculate inflorescence." I cannot but fully concur in these remarks, and it will be with these two congeners that Mr. M'Owan's *Senecio* must rank under the appropriate name chosen by that gentleman. It may, however, be that occasionally monocephalous varieties of *S. paucifolius* and *S. oxyrifolius* are formed; and again, forms of *S. tropæolifolius* with more than one capitulum, and thus the affinity between these evidently closely-allied plants would be nearer still.

Senecio tropæolifolius, M'Owan.—Herbaceous, glabrous; leaves small, peltate, cordate-orbicular, or verging into a rhomboid or renate form, repand, all radical or crowded towards the base of the stem, on long petioles; stem simple, scape-like, monocephalous, with very few distant minute scales; involucre without calycular bracts, unless [*sic!* ED.] one, as long as the discal flowers, consisting of about

13 scales; ray-flowers yellow, about twice as long as those of the disk; achenes glabrous.—On Meadows at Grahamstown (*Pet. M'Owan, Esq., M.A.*)

The only specimen transmitted is about a span long, and without root, which probably will prove tuberous. Petioles 1–2 inches long, slender; leaves measuring about one inch, without distinct teeth; the point of insertion about one-third above the base; neither nerves nor veins prominent. Involucre 3–4 lines long. Ray-flowers about 7. Disk-flowers about 20, hardly above 2 lines long, a little exceeding the copious and very tender bristles of the white pappus. Ripe fruit not seen on this occasion.

S. paucifolius, to which Mr. M'Owan justly compares his plant, though somewhat resembling it in habit, assumes by its sessile leaves of mostly ovate shape a very different appearance; the nerves, moreover, are not radiate. The flower-heads of both bear a great resemblance, as a comparison of *S. paucifolius* in the Melbourne Botanical Museum at once rendered manifest. The affinity of *S. tropæolifolius* is indeed nearer to *S. oxyrifolius;* the differences of the latter consist in a pleiocephalous inflorescence in a lesser number of scales constituting the involucre, in the absence of ligular flowers and in hispidulous achenes. On this occasion the writer would remark that amongst the extensive series of South African *Senecios*, diagnostically defined by Professor Harvey, occurs one named *S. leucoglossus* by Dr. Sonder. The specific name is, however, preoccupied by a West Australian plant, described in the second volume of the Fragm. Phytogr. Austr., p. 15. The name of the homonymous South African plant might thus be altered into *S. actinoleucus*.

NOTE ON *ERITRICHIUM GUILIELMI, A. Gray.*

By Henry F. Hance, Ph.D., etc.

Professor Miquel (Mus. Lugd. Bat. ii. 96), after a comparison with Amurian specimens of *E. radicans*, A. DC., decides that these plants are not distinct. A similar comparison certainly leads me to an opposite opinion. *E. Guilielmi* is more robust, has a smoothish stem, minutely pubescent, wide ovate and often cordate leaves, many-flowered,

naked, subpaniculate racemes, pedicels thicker, more or less recurved, and only twice or thrice as long as the calyx, the lobes of which are much broader. In *E. radicans*, on the other hand, the leaves are ovate-lanceolate or lanceolate, and with the stem strigosely hispid, the racemes are simple, very sparsely and distantly flowered, and, as remarked by Regel (Tent. Fl. Ussur. 108), leafy, the pedicels are thinner, ascending, four or five times the length of the calyx, the lobes of which are lanceolate. I do not think, taking these characters into consideration, and especially the marked difference in the racemes,—in one perfectly naked, in the other leafy to the apex,—that there can be any doubt of their distinctness. Regel's figures of *E. radicans* (op. cit. t. ix.) are very characteristic.

EUROPEAN PLANTS FOR AUSTRALIA.

We desire to call the attention of our readers to a request which we have received from our correspondent Dr. F. Mueller, of the Melbourne Botanic Gardens, in the hope that without much effort in their botanical excursions some may be able to further the object which he has in view. He writes:—"I should like to introduce not only to the Lagoon in our botanic gardens and its banks but also to suitable localities in our mountain glens, lakes, etc., some of the very ornamental European swamp and other plants of the kinds mentioned below or of others of similar habits. May I therefore ask your kind assistance in begging you to collect for me, during your excursions, seeds (or living plants, if readily available), and forward them by one of the fast-sailing vessels to my address. In exchange I shall be most happy to send to you seeds of our beautiful Australian plants. To indicate the class of plants specially referred to, I would name the following, and must leave it to you to add such others as you may have an opportunity to procure:—

Lychnis Flos-cuculi, *L.*
Lysimachia thyrsiflora, *L.*
L. vulgaris, *L.*
Hottonia palustris, *L.*
Circæa Lutetiana, *L.*
Paris quadrifolia, *L.*
Glaux maritima, *L.*
Butomus umbellatus, *L.*
Sagittaria sagittifolia, *L.*
Menyanthes trifoliata, *L.*
Parnassia palustris, *L.*
Stratiotes aloides, *L.*
Pinguicula vulgaris, *L.*, etc.

A collection of the various species of *Salix* and *Rubus* would also be most welcome."

CORRESPONDENCE.

Weeds and their Characteristics.

I am much pleased with the paper on the derivation of the word *weed* in your last number. It may be said in nature that all plants are weeds, and that there is a continual struggle going on amongst them individually for an increase of territory; and, although some may be overcome, yet, if left alone to nature's doings only, it is probable that, in the course of ages, the loss of species on the earth would be but small. According to my ideas, a plant ceases to be a *weed* when man has found that it is useful to him, takes it under his fostering care, and wages war over great areas for its supremacy over all its former weed-associates. It is therefore more by man's intervention than nature's that the great destruction of species on the earth takes place. In olden times this destruction was limited to the first civilized parts of the earth (Europe and Asia); but, since the discovery of the mariner's compass, the destroying angel has been carried into distant lands, the most powerful and potent agent being the *weed* called *Wheat*. For the sake of its cultivation fires have destroyed the forests of North America; the Silver-trees and beautiful Heaths, and all their associates of South Africa, have disappeared; extensive tracts of natural vegetation of Australia and other countries have succumbed to its influence; within these twenty years the beautiful district of New South Wales called Illawarra, where groves of Tree Ferns, Palms, and other tropical trees grew, covered with *Orchideæ* and epiphytal plants, with all the luxuriance of a Brazilian forest, have fallen before the white man's axe, and are now cultivated cornfields. The thickets of *Seaforthia*, once towering 100 feet high, are no more to be seen; solitary individuals, with Fan Palms and Tree Ferns, may yet be found in ravines and out-of-the-way places that man has not yet been able to make useful to his wants. The extinction of the Flora of this once-remarkable district is therefore only a matter of time. It is also by the agency of the white man that the native plants of New Zealand are being supplanted by the more powerful plants of the north, such as the White Clover, Water-cress, *Polygonum aviculare*, and such like other plants; as also the grassy Pampas of South America are by the European Thistle.

With regard to naturalized weeds or plants in this country, I have but little to say. It is true but few American species have become wild. One, however, has become conspicuous (*Anacharis Alsinastrum*), which at one time it was feared would choke up canals and rivers; but, as it carries its own destruction within itself, it is not now dreaded. It might have been expected that the

annual plants of California would have run wild, but as yet there is not much evidence of that. One instance has, however, lately come to my notice, that is, in the Thames Valley railway cutting near Twickenham, which for about a mile was decorated last year with the golden flowers of *Eschscholtzia Californica*. We shall see whether it is able to establish itself permanently.

Mr. Wilson informs me that *Ulex Europæus* has become wild in the Blue Mountains of Jamaica.

Yours, etc.,
J. Smith,
Ex-Curator, Royal Gardens.

Park House, Kew,
June 26, 1867.

Dr. Beigel on Pleurococcus Beigeli.

An attack upon me, evidently penned in haste, appears from the pen of Dr. Beigel, in the article on the "Chignon Fungus," with which the last number of your Journal opens, and I must ask you to be kind enough to let me make a few comments upon it. The attack has two aspects, personal and scientific. Dr. Beigel in the first place implies that all my knowledge of the fungus was derived from him, and that I have made use of information which he gave me, without acknowledgment. Why not have made the accusation boldly? He says that, "on the last Wednesday of February I called upon that gentleman (Dr. Fox) and freely communicated to him what I had discovered, viz. that the parasite was not of animal but vegetable nature." That I knew already; but he further observes that on the 2nd of March there appeared in the 'Lancet' a letter which he quotes, and in which I remark, "I beg to send you some specimens of a fungus which I have found in large quantity on false hair," etc. Dr. Beigel evidently wishes your readers to infer that I got all I knew from him. But why does he omit to state that when he called upon me I could not look at his preparations because my microscope was away at the 'Lancet' office, whither I had taken it some days before, with specimens of the fungus, to exhibit to the editor and others there; specimens of the very fungus too, which he had brought to show me, and which I had already obtained from the very place whence his specimens came? Dr. Beigel has never yet described the fungus himself, but quoted merely the opinions of German authorities, and, save his drawings, he shines in borrowed plumes; yet he would make believe that he has dispensed to me a mass of knowledge, whereas I differ from him in almost every particular. This is not plagiarism. We must have obtained the fungus independently of each other somewhere about the same time, when so much stir was made about the matter of "chignons." By all means let Dr. Beigel be considered the discoverer; but I utterly repudiate the idea that I made use of information obtained from him, when, indeed, at the time he visited me, his stock had not as yet arrived from Germany. So much for the personal question; now for the science. Dr. Beigel wishes it to be believed that I pronounced the bodies which he exhibited at the Pathological Society to be *animal*, because I called them "Gregarines." I had already, in the 'Lancet' the week before, stated

that they were Fungi. I used the term "Gregarines" in the same sense as that in which Lindemann employed it; in fact, I believed that the bodies which Dr. Beigel showed were those described by Lindemann as Gregarines, which he declares to be vegetable. Lindemann refers to Lebert, who found similar bodies in the disease called favus. This view and use of the term is adopted also by Robin ('Les Végét. Paras., 2nd edit. p. 291), Leydig (Müller's Archiv, 1851, p. 221, and Arch. für Anat. u. Phys., 1863, p. 191), and others. That I used the term in reference to a vegetable was clear from the fact of my stating that I was germinating the growth in a saccharine solution, from the brief and unreported description I gave at the Pathological Society of the cell-elements and the movements of the contained granules, and my original letter in the 'Lancet.' Dr. Beigel's attempt to father me with the declaration that the fungus was an animal is absurd, and only shows how unacquainted he is with the written opinions of well-known authors. With regard to the article in 'Science Gossip,' showing my development of knowledge on the subject, *pari passu*, with the development of the plant as shown by Dr. Beigel at the Pathological Society, I need only say that its contents are wholly at variance with Dr. Beigel's opinions. I wrote it because especially asked to do so. It did one thing—thoroughly demolished *Pleurococcus Beigeli*. It showed that the fungous growth on the hair was only a modification of a well-known form. This no doubt explains the tone of Dr. Beigel's communication. Dr. Beigel shows his annoyance at my presuming to deprive him of his pet *Pleurococcus*, but I can't help it. He had much better not have shown it by accusing me of drawing everything that came within the range of my objective, and confounding various *Algæ* and *Infusoria* with the *Pleurococcus*, which must be now considered "defunct." I am content to bide my time. I used the greatest care, expended very much time and trouble over the matter, and I suppose no one in this country has gone into the subject of vegetable parasitic diseases, and the artificial growth of fungi, more fully than myself; and my observations in the case of the "chignon fungus" were checked by the eye of a very acute observer of minute life. I did see spores, assuming an algal form, enlarging, becoming filled with small cells and getting ciliated. The cilia were very difficult to make out with a $\frac{1}{12}$ objective. My drawings are *like* Actinophrys, it is true, but figure something else. Dr. Beigel is a man of lively parts; he has been too anxious to "dub" me a plagiarist and a blunderer in science, and really I think the tables might be very justly turned upon himself.

I am, Sir, yours faithfully,

TILBURY FOX, M.D.

July 12*th*, 1867.

On the so-called Chignon Fungus.

Will you allow me to say a word with regard to the so-called Chignon Fungus? Firstly, with regard to the use of the term "Gregarine" by Lindemann, in describing this or a similar growth on the hair of Russian peasants. A

confusion has arisen in this matter, owing to the doubtful nature of the parasitic bodies of fish, called Psorosperms. Leydig compared these Psorosperms to the pseudo-naviculæ of *Gregarinæ*, and hence inferred that they were animal parasites. M. Ch. Robin, on the other hand, considers Psorosperms as vegetable bodies; and Dr. Balbiani and others have described *undoubtedly vegetable* bodies as Psorosperms. By an amalgamation of these two views, a *vegetable* granular mass which gives rise to Psorosperm-like bodies has got called a Gregarine. This is, of course, most erroneous, and has led to much misunderstanding. The organisms to which Dufour applied the name *Gregarina* are, without any doubt, animals; and though, in their mode of development and certain points of form, there are great resemblances between these animals and some of the lowest *Algæ*, there is, at the same time, "a hard and fast line" to be drawn between them, which however wants a little clearing up of imperfectly known forms (such as Psorosperms, etc.) to make it properly apparent. Dr. Fox, I imagine, has merely used the term Gregarine in the same sense as Lindemann did; and I hope it may never be again misappropriated thus. Secondly, Dr. Beigel, in his second letter to the 'Lancet,' says that his *Pleurococcus* does not destroy the hair, and is therefore distinct from that described by Dr. Fox. Dr. Fox was good enough to send me specimens of hair with the little dark parasitic knots. I found that the fungus was identical with *Pleurococcus Beigeli*, and moreover that it *does affect* the hair. When the parasitic knot is removed, the hair-shaft is found to be thinner beneath than elsewhere, and shreds of the hair-cuticle readily separate with the fungus from the hair.

Truly yours,

E. RAY LANKESTER.

Melton House, Hampstead, July 6th, 1867.

Discovery of Epilobium anagallidifolium, *Lam., in Cumberland.*

On the 28th of June I visited Crossfell, Cumberland, and about 400 feet below the summit, on the north-west of the mountain, I found several plants of *Epilobium anagallidifolium* (specimens of which I enclose), growing in a sheltered locality, where, as in several other places, the water issues from the rock in a copious stream. This plant has not yet been observed as a native of England, but from the altitude at which it grew, I could not doubt the possibility of a plant of the Scottish mountains being also found truly indigenous on Crossfell. The mountain attains an elevation of 2928 feet, and is the highest point of the Pennine range. Nearly the whole of the hill is mountain limestone, and it rests (as may be seen on ascending the hill from Melmerby) on clay-slate; in fact, it is a continuation of the West Cumberland range.

Yours truly,

FRED. ADDISON.

Cleator, near Whitehaven,
July 9th, 1867.

BOTANICAL NEWS.

Mr. W. G. Smith has published (Hardwicke, London) two large coloured sheets of fungi, the one of edible and the other of poisonous or doubtful species. Mr. Smith has made this subject so thoroughly his own, and his pencil so faithfully depicts the plants he loves,—as our readers know,—that it is unnecessary to say that they are admirable portraits of the various species. We hope they will soon be hung in every school-room in England. If our children became acquainted with the numerous valuable species we would have a valuable addition to our indigenous articles of food, which would not only give a relish but considerable nourishment to the consumer. The drawings are accompanied with a small volume of letter-press, in which Mr. Smith narrates his own experiences and gives many valuable hints as to the collection, habitats, characters, and cooking of his pets.

Every working botanist will rejoice in the appearance of the first instalment of Dr. Anderson's 'Monographia Salicum hucusque cognitarum.' It contains 103 species, and is illustrated by plates. The concluding part is soon to follow. M. Bureau has published, in the 'Revue des Cours Scientifiques,' a popular address he delivered on Coal Plants, with woodcuts of the principal types. The same subject is dealt with in an article in the current number of the 'Popular Science Review,' by Mr. W. Carruthers, in which he brings together some of the interesting discoveries he has made as to the structure and affinities of the remarkable plants of this period. Mr. John Hogg sends us his 'Ballast Flora of the Coasts of Durham and Northumberland,' reprinted from the 'Annals of Natural History,' which is worth reading. From Dr. Francis Buchenau, of Bremen, we have two interesting contributions, 'The Inflorescence of *Juncaceæ*,' and 'Index Criticus Juncaginearum hucusque descriptarum.' Mr. Alfred Kirchhoff furnishes a well-written pamphlet on 'Wolff''s and Goethe's Ideas on the Metamorphosis of Plants,' which we should like to see rendered into English. Dr. J. E. Planchon has delivered a discourse on 'Rondelet et ses Disciples, ou la Botanique à Montpellier au XVIme Siècle;' to which, in conjunction with Prof. G. Planchon, he has published, in the 'Montpellier Médical,' an appendix. Both are valuable contributions to the history of botany. From Dr. Ferdinand von Herder we have an 'Enumeration of the monopetalous plants collected by G. Radde in S.E. Siberia,' illustrated by plates representing Loniceras and Viburnums. Dr. Regel supplies a systematic list of all the different sorts of apples cultivated in Russia,—a precursor of a much larger work, to be published at the request of the St. Petersburg Horticultural Society. From our esteemed correspondent, Dr. Hance, of Macao, we receive his 'Adversaria in Stirpes imprimis Asiæ orientalis criticas minusve notas, interjectis novarum plurimarum diagnosibus.' It is full of new and instructive matter. Professor Alexander Braun establishes a new genus of *Scrophularineæ* (*Schweinfurthia*),

allied to *Linaria*; and Dr. Asherson supplies an article on *Antidiaris*, which he shows to have more than one species. Both are reprinted from the 'Proceedings of the Berlin Academy.' Professor Braun has also published, in the Bot. Zeitung, a posthumous paper of Dr. Mettenius, on *Phylloglossum*, to which we would call special attention. Professor T. Caruel has printed a valuable paper on the changes wrought in the flora of Tuscany by introduced plants during the last three centuries ('Di alcuni Cambiamenti avvenuti nella Flora della Toscana in questi ultimi tre secoli'). Mr. William Colenso has done good service to science by publishing, in connection with the New Zealand Exhibition of 1865, an "Essay on the Botany of the North Island of New Zealand," filling 58 pages. The "Report of the Marlborough College Natural History Society, for the half-year ending Christmas, 1866," has come to hand, and shows that this young Society is increasing in vigour and usefulness. The same remark applies, with perhaps greater force, to the Acclimatization Society of South Wales, the last Report on which has just reached us.

Old Engelbert Kæmpfer, the celebrated German traveller of the seventeenth century, has been honoured with a monument. It was erected a few days ago in the little town of Lemgo, in the principality of Lippe (Kæmpfer's birthplace), and consists of a column twenty feet high, ornamented with Gothic arches and pinnacles. On the monument Kæmpfer's travels are indicated as follows:—"Persia, 1684-1688; Java, 1689; Siam, 1690; Japan, 1690, 1691, 1692." The column bears, besides, the following inscription:—"Engelbert Kæmpfer, born at Lemgo, 16 September, 1651, died at Lieme, 2 November, 1716." Kæmpfer's manuscripts and the portion of his herbarium collected in Japan, as well as the plants he obtained from the Botanical Gardens at Leyden, as is well known, were bought by Sir Hans Sloane, and are kept (for the greatest part unpublished) in the British Museum.

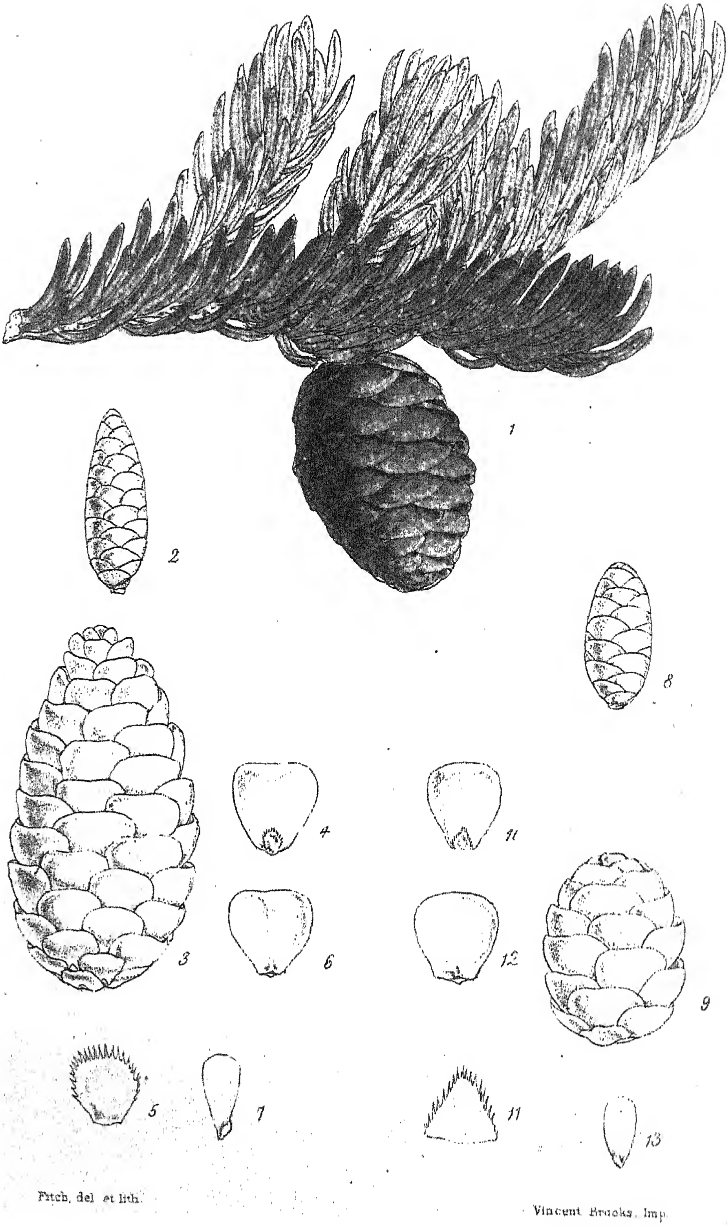
The series of Reports on the Paris International Exhibition now publishing in the 'Illustrated London News' have been drawn up at the instance of the Committee of Council on Education. Those relating to botany in its widest sense are the following, viz. "Products of the Cultivation of Forests, and the Products appertaining thereto," by Mr. P. L. Simmonds; "Agricultural Products (not used as food) easily Preserved," by Dr. T. Thomson, F.R.S.; "Cereals and other Edible Farinaceous Products, and the Products derived from them," by Mr. Harry Chester; "Vegetables and Fruit," by Dr. Hogg; "Flowers and Ornamental Plants," by Mr. T. Thomson; and "Seeds and Saplings of Forest Trees," by Dr. Hooker.

A wealthy citizen of Berlin has applied to the municipality of that town for a site on which to erect a statue of Francis Drake, as the introducer of the Potato into Europe, and offers to subscribe £2250 towards the statue. This seems an easy way of settling the doubt lingering about the early history of the Potato, and to which the corrupted Spanish name which the plant bears in English, and the corrupted Italian it bears in German, or the unmeaning French and Dutch ones, give no clue.

Botanical Society of Edinburgh.—*Thursday*, 13*th June*.—William Gorrie, Esq., Vice-President, in the chair. The following communications

were read:—1. On the Arctic *Cladoniæ*. By W. Lauder Lindsay, M.D., etc. The Arctic regions include vast level, generally treeless, barren tracts of country, whose vegetation is frequently exclusively lichenose; sometimes, indeed, consisting of a single species, the cosmopolite *Cladonia rangiferina*. The author enumerated the different species and their forms, belonging to the *Cladoniæ*, found in Arctic countries, and remarked that, whether these may be regarded as consisting of many or few species, their importance to man cannot be estimated by their mere numerical relations; one species at least (*C. rangiferina*) is not only superior in economical and even political importance to the better-known "Orchella weed," but it is even on a footing with the valuable grains, timber trees, and other phanerogams of more favoured regions. The author considered the economical value and applications of the Arctic *Cladoniæ* under the following heads:—1, as fodder or forage to animals, domesticated or wild; 2, as an ingredient of man's food; 3, as medicines, being used as tonics, astringents, febrifuges, emetics; 4, in the arts—*e.g.* perfumery and dyeing. 2. Recent Regulations regarding the Forest Department of India. By Professor Balfour. Dr. Balfour called the attention of the Society to some particulars respecting the selection of candidates for nomination to junior appointments in the Forest Department of India. He stated that the candidates, after passing a preliminary examination in English, arithmetic, algebra, and geometry, were to undergo a regular course of studies and training for three years and a half in the natural sciences, in the practice and science of forestry, and in those branches of surveying and engineering required for the profession of a forest officer in India. The first, or purely scientific part of this course of training, will take place in Great Britain. For the second part, comprising the instruction in forestry, arrangements are to be made on the Continent, in the meantime, until an efficient forest school is established in Great Britain or in India. The studies of candidates during the first or scientific part of their training is to comprise the following subjects:—1. Mechanical and Natural Philosophy.—The elements of mechanics, hydrostatics, hydraulics, optics, heat, climate, rain-fall, and the first elements of electricity and magnetism. 2. Chemistry.—*Inorganic*—The non-metallic elements and the principal metals. *Organic*—Elements only, with special reference to the chief constituents of the vegetable and animal organism, the chemical principles of the process of nutrition, and of respiration in plants and animals; fermentation, decay, putrefaction, destructive distillation. 3. Botany.—Characters of the principal European natural orders. Ability to describe any common phænogamous plant of ordinary structure systematically and with accuracy from a living specimen. The elementary facts referring to the development and nutrition of plants. 4. Geology.—Elementary portions of descriptive geology. 5. Either the French or the German Language.—Good colloquial knowledge, with the facility to read and translate into English easy passages taken from the works of some classical writer. Candidates are at liberty to choose the place of study, but they must, before being admitted to the second or practical part of instruction, pass an examination before the Civil Service Commissioners in the branches of science, and in one of the languages enumerated above. Candidates who have

taken academical degrees or honours in science and mathematics will, wholly or partially, be excused from the examination of admission, as well as the examination in sciences, and only be required to furnish proof of a sufficient knowledge of German or French. Candidates who have passed any examination requiring a sufficiently high standard of proficiency will be excused examination in the branches in which they have been previously examined. Her Majesty's Secretary of State for India will determine how far the certificates of candidates may entitle them to exemption, either entire or partial, from examination. It is very desirable that candidates should, before proceeding to the Continent for their professional training, devote two months to a practical apprenticeship with an approved wood manager or forester in Scotland. Early spring is the best season of the year for this purpose. A certificate of their having done so will entitle them to a stipend of £20, to be paid in case they pass the science examination. The course of training in forestry abroad will commence on the 1st September, 1869, and be concluded on 1st September, 1871, and will be conducted either at Nancy, in France, or at Hanover. 3. Recent Botanical Intelligence. By Professor Balfour. 1. Tendrils of the *Cucurbitaceæ*. 2. Sexual Organs of *Fungi*. 4. On a supposed New Species of *Vellozia*, or probably a New Genus in the Order *Hæmodoraceæ*. By Professor Balfour. Dr. Balfour stated that he had received from H. Fox Talbot, Esq., the flowers of a plant which he had transmitted to the Royal Botanic Garden last year. It is a native of Natal, and appears to belong to the nat. ord. *Hæmodoraceæ*. It has not yet flowered in the Botanic Garden; but the following are some of the characters taken from the plant and from the flowers sent by Mr. Talbot:—Stems shortened, triangular, covered with brown scales at the lower part. Leaves with equitant venation, alternate distichous, sheathing at the base, lanceolate, about 6 inches long, margins with sharp serratures, apex sometimes split. Flowers solitary, on slender peduncles, about 6 inches long; perianth six-leaved, at first delicate lilac, afterwards becoming greenish-white, dry, and persistent, the green colour appearing particularly in the veins, which become prominent; outer leaves of perianth ovate-oblong, and somewhat acuminated: inner leaves bluntish. Stamens six, with very short filaments; anthers two-celled, narrow, about five times longer than the filaments, opening longitudinally and laterally. Pistil about the length of the stamens. Ovary inferior (one or three celled), style thick, stigma large, somewhat tongue-shaped, grooved. Ovules oblong, numerous, attached to central placenta, anatropal. Vellozias are chiefly natives of Brazil. This plant seems to represent the genus in Africa, and possesses interest on that account. Dr. Balfour proposed to call it *Vellozia Talboti*. It may turn out to be a new genus. If so, the name *Talbotia* will be given to it; but the determination of this point must be delayed until the plant flowers at the Botanic Garden. 5. On the Discovery of *Orthotrichum phyllanthum* near Edinburgh. By Mr. John Sadler. Mr. Sadler had recently collected it on rocks by the sea at Dalmeny Park.



Fitch, del. et lith.

Vincent Brooks, Imp.

DESCRIPTION OF A NEW CONIFER FROM ARCTIC AMERICA.

By Andrew Murray, Esq., F.L.S.

(Plate LXIX.)

Abies arctica, *A. albæ* affinis, foliis crassioribus, strobilis minoribus, squamis subrotundatis, bracteis triangularibus, dignoscitur.

Hab. In America boreali, prope Behring's Straits.

Nearly allied to *Abies alba*, but differs in the following particulars:—the pulvini are broader, and the leaves thicker than in it; the stomata are larger, and not so distinctly in rows; the cones are smaller and shorter; the scales are differently shaped, being rounded in front instead of nearly straight; the bracts are acute and triangular instead of being sheaf-shaped. The different parts are contrasted in the Plate.

This is the most northerly tree that has been met with on the north-west coast of America. It was found in the voyage of H.M.S. Herald forming forests on the banks of the rivers Noatak (Bedford Pim!) and Buckland (Berthold Seemann!), on the American side of Behring's Straits. This latitude is nearly seven degrees further north than the limits of the woods on the eastern side of the American continent.

Dr. Seemann, in his 'Botany of the Herald,' mentions that some of the trees measured by Lieutenant Bedford Pim, R.N., were from twenty to fifty feet high, and from four to five feet in circumference. Sections of these are preserved in the museum of the Royal Botanic Gardens at Kew, and specimens of the foliage and cones are preserved in the herbaria at Kew and the British Museum.

Dr. Seemann records this species as *Abies alba*. He seems, however, to have had some doubts about its being so, although he finally convinced himself that the strange aspect of the specimens, and the points in which they differed from specimens grown in more genial climes, were merely owing to physical influence "which in this case, as in many others, stamps upon the species the true Arctic character."

No one will dispute that it is the climatic and other physical influences of the regions where it grows which have stamped its character upon it, but it does not follow that therefore that character is not specific. It appears to me that the differences have crossed the boun-

dary which separates a species from a variety. In deciding upon such differences, I think that *habit* is the character of the most importance among those which, from the impossibility of sharply defining them, may be called empirical; and among those which can be defined, I find that of the bract of the scale the most constant and serviceable. Here the two bracts are very distinct.

The desolate country where this tree is found is thus described by Dr. Seemann:—"There is nothing to relieve the monotony of the steppes. A few stunted Coniferous and Willow trees afford little variety, and even these, on passing the boundary of the frigid zone, are either transformed into dwarf bushes or disappear altogether. About Norton Sound groves of White Spruce Trees and *Salix speciosa* are frequent; northwards they become less abundant, till in latitude 66° 44′ north on the banks of the Noatak, *Pinus alba* [*arctica*] disappears."

Explanation of Plate LXIX.

Fig. 1. *Abies arctica*, mature cone and foliage: (8) young cone; (9) mature cone; (10) scale, outer side; (11) bract—*magnified*; (12) scale, inner side; (13) seed. Fig. 2. *Abies alba*, young cone: (3) mature cone; (4) scale, outer side; (5) bract—*magnified*; (6) scale, inner side; (7) seed.

CONTRIBUTIONS TO BRITISH LICHENOLOGY.

By Isaac Carroll.

(*Resumed from Vol. IV. p.* 26.)

Leptogium chloromelum (Sw.), Nyl. Syn. i. p. 128.—Hibernia, Nyl. l. c.

Pyrenopsis lecanopsoides, Nyl. = *Collema pyrenopsoides*, Nyl. Syn. i. p. 203.—On limestones by the sea at Kenmare (Jones).

Sphærophoron compressum, Ach.—Killarney, with *apothecia* (Moore and Carroll).

Gomphillus calicioides, Nyl.; var. *microcephalus*, Nyl. Syn. Lich. i. 75 = *Bæomyces microcephalus*, Tayl.—On moss of young trees, Turk Mount, Killarney, Dec. 1866 (Carroll).

Physcia ciliaris (L.), De Cand.—Rare in Ireland. On trees, Oak Park, near Carlow (Moore). Var. *saxicola*, Nyl.—Sybil Head, Kerry (Carroll). *Vide* Mudd, Man. p. 105.

P. stellaris (L.), Fr.; f. *isidiophora*, Nyl. = *Parmelia columnaris*, Tayl.--Kerry (Tayl. in Herb. Jones).

Lecanora Dicksonii (Ach.), Nyl.—High mountains, north of Ireland (Moore); on columnar basalt, Croghane, Killarney (Carroll).

L. Hutchinsiæ, Nyl. in Flora of Regensburg, 1867, p. 326.—Thallus pallido-cinerascens vel flavido-cinerascens, tenuis, rimosus vel rimuloso-diffractus; apothecia rufo-testacea (latit. 0·5 millim.), convexa, biatorina; sporæ 8-næ, incolores, fusiformes, 1-septatæ (longit. 0·010–12 millim., crassit. 0·0025–0·0035 millim.); paraphyses crassulæ (crassit. 0·0025–0·0035 millim.), nonnihil articulatæ, apice incrassato incolore; hypothecium incolor. Iodo gelatina hymenea cærulescens (cum thecis, quæ apice intensius tinguntur).—On rocks, south of Ireland (Hutchins).—"Facies *Lecideæ* cujusdam propinquæ *vernali*, sed theoretice *Lecanora*, nam spermogonia ut in stirpe *Lecanoræ subfuscæ*, ubi accedit ad *erysibem*. Sporæ tenues et paraphyses crassæ speciem distinguunt. Spermatia arcuata, longit. 0·020 millim., crassit. vix 0·001 millim."

L. umbrina, Ach.—Barclay's Rock, co. Down (Jones); cliffs of Moher, Clare (Carroll).

Pertusaria velata (Sm.).—Glengariff (Jones).

Lecidea phæops, Nyl. = *Lecanora Rhætica*, Hepp.; var. *hyperborea*, Nyl. (*olim*).—Scotland (Jones); Brandon Mount and Connor Cliffs, Ireland (Carroll).

L. consentiens, Nyl., Flora, 1866, p. 371.—Thallus albidus, mediocris, rimoso-diffractus; apothecia nigra, innata (latit. 0·9–1·5 millim.), plana, nonnihil sæpius impressa et inde quasi margine obtuso sæpe cincta; sporæ 8-næ, incolores, ellipsoideæ, simplices, longit. 0·027–38 millim., crassit. 0·016–22 millim.); paraphyses graciles (crassit. 0·0010–0·0015 millim.); epithecium fuscescens; hypothecium fuscum. Gelatina hymenea iodo cærulescens, dein nonnihil sordide vinose rubescens (fulvescens).—Summit of Ben Lawers, on Mica-slate (Jones). "Facies *Lecanoræ cinereæ* formæ. Differt *L. consentiens* ab affini *L. Rhætica* (*phæops*), *sporis majoribus*, epithecio fuscescente (in *L. Rhætica* (*phæops*) epithecium cærulescens vel cæruleo-nigrescens), reactione iodica (nam in *L. Rhætica* gelatina hymenea iodo intense et persistenter cærulescit). *L. panæola* differt cephalodiis, thallo hypochlorite calcico saltem diluto erythrinice tincto, etc."

L. panæola, Ach.—Ben Lawers, etc., Scotland, and plentiful on the basalt of the co. Antrim (Jones).

L. intermixta, Nyl. = *L. atropurpurea*, Schær.—On moss, Glengariff and Cromaglown (Jones).

L. circumpallens, Nyl. Flora, 1866, p. 370.—Thallus pallide cinerascens, tenuis, rimosus; apothecia fusco-nigra (latit. circ. 0·5 millim.), margine (perithecio) pallido demum excluso et sæpe tum tota fuscorufescentia, plana vel convexiuscula, intus incoloria; sporæ 8-næ, fusiformes vel fusiformi-aciculares, rectæ, (1–)3-septatæ (longit. 0·018–25 millim., crassit. 0·0020–0·0035 millim.); epithecium vage nonnihil nigrescens aut subincolor; hypothecium incolor; paraphyses crassiusculæ, non bene discretæ. Gelatina hymenea iodo vinose rubens.—On the ground, Ross and Kilkee, Clare (Carroll). Spores usually much broader than in other *Bacideæ*. "Vix nisi varietas *L. bacilliferæ*," Nyl.

L. globulosa, Flk. = *L. anomala*, Fr., Nyl., Scand.—On Birch, Glencar, Kerry (Carroll).

L. holomeloides, Nyl. Flora, 1866, p. 369.—Thallus obscurus vel nigricans, tenuis, discontinue effusus, subgranulatus; apothecia nigra, convexula (latit. 0·4–0·5 millim.), immarginata, intus obscura; sporæ 8-næ, incolores, oblongæ vel subbacillares, 1-septatæ, variabiles (longit. 0·010–17 millim., crassit. 0·0030–0·0035 millim.); paraphyses haud discretæ; epithecium nigricans; hypothecium subincolor vel leviter sordide fuscescens. Gelatina hymenea iodo (saltem leviter) cærulescens, dein lutescens.—Ben Lawers, on mica-slate (Jones). "Accedit ad *globulosam*, sed faciem habet *melænæ*."

L. melæna, Nyl.—On turf, Howth (Jones); Killarney (Carroll).

L. aphana, Nyl. Flora, 1867, p. 327.—Thallus griseus, tenuis, subverrucose vel subgranulose inæqualis, indeterminatus; apothecia nigra, parvula (latit. 0·2–0·4 millim.), convexula, immarginata, intus albicantia; sporæ 8-næ, incolores, ellipsoideæ vel oblongæ, simplices (longit. 0·008–0·011 millim., crassit. 0·0035–0·0045 millim.); thalamium vage violacee fuscescens (epithecio vix obscuriore); paraphyses non discretæ; hypothecium incolor (vel interdum vage infra tenuiter violaceo-fuscescens). Iodo gelatina hymenea cærulescens.—On rocks, Kilkee (Carroll).

L. leiotea, Nyl. Flora, 1867, p. 328.—Thallus fuscus, tenuis, verniceus, lævis, determinatus, obsolete rimulosus; apothecia nigra, plana (diam. circiter 0·5 millim. vel minora), obtuse marginata vel margine non distincto, adnata; sporæ 8-næ, incolores, ellipsoideæ, simplices (longit. 0·008–0·011 millim., crassit. 0·006–7 millim.); paraphyses me-

diocres, apice fuscescente crassiores et ibi vulgo aliquoties septato-articulatæ; hypothecium incolor. Iodo gelatina hymenea nonnihil cærulescens.—On columnar basalt, Crogham, Killarney (Carroll).

L. furvula, Nyl. Flora, October, 1866 (incorrectly printed *furvella*).—Ben Lawers (Carroll). "Differt a subsimili *L. furvella* hypothecio atro, epithecio (et thalamio superne) cærulescente, sporis minoribus, etc."

L. episema, Nyl.—Parasitic on thallus of *Lecanora cinerea*, shore of Kenmare Bay, near Dunkerron (Jones).

L. atro-fuscescens, Nyl. Flora, 1866, p. 371.—Thallus cinereo-nigricans vel fusco-nigrescens, deplanatus, areolato-diffractus, subopacus; hypothallus niger, hinc inde visibilis; apothecia nigra, adnata, plana (demum convexiuscula), marginata, mediocria (latit. 0·9–1·2 millim.), sæpe subangulosa, intus subincoloria; sporæ 8-næ, incolores, ellipsoideæ (longit. 0·018–20 millim., crassit. 0·009–0·011 millim.); epithecium fuscescens; paraphyses graciles, teneræ, subirregulares; hypothecium incolor. Gelatina hymenea iodo cærulescens, dein (pro parte saltem) vinose rubescens.—Ben Lawers, on mica-slate (Carroll). "Facie inter *L. fusco-atram* et *L. tenebrosam* quasi media, sporis majoribus inter species subsimiles mox dignota (præter alias notas)."

L. mesotropa, Nyl. Flora, 1867, p. 328.—Thallus cinerascens, verrucoso-areolatus, indeterminatus (mediocris crassitie); apothecia fusconigra vel nigricantia, opaca, planiuscula, adnata (latit. 0·6–0·9 millim.), margine obtuso vel evanescente, intus albida; sporæ 8-næ, ellipsoideæ (longit. 0·009–0·013 millim., crassit. 0·005–6 millim.); paraphyses gracilescentes, vulgo non discretæ; epithecium fuscescens; hypothecium incolor.—On rocks, Ben Lomond (Crombie). "Est quasi intermedia inter *L. lapicidam* et *L. lithophilam*, thallo fere illius, apotheciis fere hujus, nec forsan species propria. Apothecia sæpe faciei biatorinæ."

L. umbonella, Nyl. Flora, 1866, p. 372=*L. umbonata*, Mudd, Man. p. 204 (sed non *Biatora umbonata*, Hepp.).—Thallus albidus vel pallidus, sat tenuis, determinatus (maculatim vel insulatim crescens), rimoso-diffractus; apothecia nigra, parva (latit. fere 0·5 millim.), innata, marginata, sæpius subgyrosa vel centro umbonata; sporæ 8-næ, incolores, ellipsoideæ (longit. 0·011–14 millim., crassit. 0·006–8 millim.); epithecium subincolor; paraphyses mediocres; hypothecium fuscum vel fuscescens (umbo et perithecium fusco-nigricantia, in lamina tenui). Gelatina hymenea iodo bene cærulescens.—Benmore, on mica-slate (Jones). "Prope *L. gyrizantem* locum habeat."

L. succedens, Nyl. Flora, 1866, p. 372.—Thallus albidus, tenuis, granulato-inæqualis vel subareolatus; apothecia fusco-nigra, fere mediocria, marginata, intus incoloria; sporæ 8-næ, nigrescentes, ellipsoideæ (pariete tenui), simplices aut 1-septatæ (longit. 0·011–0·014 millim., crassit. 0·0045–0·0055 millim.); paraphyses mediocres, articulatæ, apice incrassato (crassit. fere 0·0045 millim.) fusco vel fuscescente; hypothecium fuscum (vel rubricose fuscum). Gelatina hymenea iodo cærulescens, dein viose rubens.—On rocks, Ben Lawers (Jones). "Comparetur *L. secedens*, Nyl., arcte affinis. Locus systematicus prope *L. nigritulam*."

L. segregans, Nyl. Flora, 1866, p. 372.—Thallus albidus vel albidocinerascens, verrucoso-granulosus, granulis variis convexulis plus minus segregatis (alibi verrucoso-confluentibus) laxe adnatis, hypothallo nigricante sæpius parum visibili; apothecia nigra, planiuscula, immarginata, demum convexa sæpeque aggregato-confluentia, sat parva (latit. 0·4–0·6 millim., vel aggregata minora), intus concoloria; sporæ 8-næ, incolores, oblongæ, simplices (longit. 0·010–13 millim., crassit. 0·0035–0·0045 millim.); hymenium sordide tinctum; epithecium haud obscuratum; paraphyses mediocres, non bene discretæ; hypothecium fuscum. Gelatina hymenea iodo dilute cærulescens, dein mox vinose fulvescens.—On rocks, Ben Lawers (Jones). "Prope *L. melancheimam*, Tuck., disponenda videtur, tamen locus non certus, nam spermogonia nondum inventa."

L. pulverea, Borr. = *L. incana*, Dél. = *L. commutata*, Ach.? Glengariff, on oak (Jones); Turk Mount, Killarney, on larch (Carroll).

L. lenticularis, Ach. **L. chloropoliza*, Nyl. Arm. p. 411.—Rocks near Kilkee (Carroll).

L. sanguinaria, Ach.; f. *minor*.—On larch, Turk Mount (Carroll). Rare in Ireland.

L. homalotropa, Nyl. Flora, 1867, p. 329.—Thallus albus, glaber, tenuissimus vel macula alba subdeterminata indicatus; apothecia nigra, fere mediocria (latit. circiter 0·5–0·6 millim.), plana, marginata, epithecio subrugoso; sporæ 8-næ, incolores, cylindraceæ, multiseptatæ (septis plurimis et vulgo singulis inter se magis approximatis quam crassities sporæ), longit. 0·130–0·140 millim., crassit. 0·0045–0·0050 millim.; paraphyses gracilescentes, nonnihil anastomosantes; epithecium obscuratum; hypothecium (sat tenue) nigricans. Iodo gelatina hymenea non tincta.—On ash, etc., between Killarney and Kenmare (Carroll).

"Est species vicina *L. urceolatæ*, Ach., et differens præcipue apotheciis planis." This is unlike any other British species. *L. urceolata* is American.

Agyrium rufum (Pers.), Fr.—On old stems of *Calluna vulgaris*, L. foot of Croghane Mount, Killarney (Wright and Carroll), April, 1867.

Opegrapha saxigena, Tayl.—On basalt, Croghane, Killarney (Carroll).

Arthonia ilicinella, Nyl. Flora, 1867, p. 179.—On young trees, Turk Mount (Carroll). Near *A. ilicina*, Tayl., but the spores are much smaller, and the hymeneal gelatine "iodo vinoso rubescente" (in *A. ilicina* cærulescente). Apparently rare at Killarney.

Melaspilea amota, Nyl. Flora, 1867, p. 178.—Thallus macula albida indeterminata indicatus vel vix ullus distinctus; apothecia nigra, innata, rotundata vel rotundo-difformia (latit. 0·5 millim., vel parum amplius), margine proprio tenui inæquali; sporæ 4–8-næ, incolores, 1-septatæ, medio constrictæ (longit. 0·016–22 millim., crassit. 0·007–0·010 millim.); paraphyses vix ullæ; thecæ confertæ; epithecium fuscescens vel fusco-luteum; hypothecium tenuiter et leviter vage obscuratum. Iodo gelatina hymeneum vel thecæ dilute cærulescunt (qui color dein evanescit).—On oak, Turk Mount (Carroll). "A *M. arthonioide* (*Sprengelii*, Ach.) mox paraphysibus deficientibus distat."

Verrucaria microsporoides, Nyl.—Plentiful under a shaded ledge of rocks at Kilkee (Carroll).

V. acrotella, Ach. = *V. mutabilis*, Borr.—Carrig Mount, Kerry (Tayl.); Bantry (Hutchins); Ballinhassig, Cork (Carroll).

V. epigæoides, Nyl. Flora, 1867, p. 327.—On the ground cliffs of Moher, co. Clare (Carroll).—"Similis *epigææ*, sed minor et sporis 3-septatis. Vix sumi possit pro statu terrestri *V. chloroticæ*, nam obstant jam apothecia immersa et profunda, perithecio alio."

V. lucens, Tayl.—On basalt, Croghane (Carroll). A fine species, with very prominent apothecia, large fusiform 7-septate spores, and remarkably stout paraphyses.

V. capnodes, Nyl. = *V. rhyponta*, Borr., Leight. (non Ach.).—Growing in small patches on thallus of *Graphis sophistica*, Nyl., in Castlebernard Park, Bandon. Distinguished from *V. rhyponta*, Ach., by its entire perithecium and uniseptate spores.

V. glabrata, Ach. = *V. achroopora*, Nyl. Flora, 1867, p. 179, et *V. glabratula*, Nyl. Flora, 1867, p. 330.—Killarney (Carroll). These two forms,

I suspect, are states of the same thing. Var. *glabratula* (as they may be called) differs from *glabrata* in its small sub-immersed or immersed apothecia, and smaller, less obtuse, and narrower spores.

V. antecellens, Nyl.=*V. analeptoides*, Nyl. Flora, 1867, p. 180.—On young trees, Turk Mount and Loughcooter, Galway (Carroll).

V. advenula, Nyl.=*V. rimosicola*, Leight.—On thallus of *Lecidea excentrica*, Killarney (Jones); Loughcooter, Galway (Carroll).

V. albissima, Ach. f.—Little Island, Cork (on *Arbutus*), and Killarney on *Ilex* (?) (Carroll).

V. desistens, Nyl. Flora, 1867, p. 180.—Thallus vix ullus proprius; apothecia perithecio integre minuto (diam. 0·1 millim.), parte dimidia supera convexa prominula; sporæ 8-næ, incolores, fusiformes 3-5-septatæ, rectæ (longit. 0·011–16 millim., crassit. 0·0003–4 millim.); paraphyses nullæ. Iodo gelatina hymenea vinose rubens.—Killarney, on holly (Carroll). "Prope *V. albissimam* locum habeat, sed recedit variis notis a stirpe *V. epidermidis*.

ON *ADIANTUM CAPILLUS-JUNONIS*, *Rupr.*; WITH DESCRIPTIONS OF TWO NEW FERNS FROM NORTHERN CHINA.

By H. F. Hance, Ph.D., etc.

So far as my knowledge extends, no further account of the above Fern has ever been given by Dr. Ruprecht than the following brief note:—"Species eximia, *A. lunulato*, Burm., ut videtur, proxime affinis, sed pinnis minoribus suborbiculatis, infimis suboppositis, stipite flaccido, superne subnudo, flagelliformi, apice spiraliter involuto (et radicante?) insignita." This appears at page 49 of his 'Distributio Cryptogamarum Vasc. in Imperio Rossico,' published in July, 1845, and forming the second fasciculus of the 'Beiträge z. Pflanzenkunde des Russischen Reiches,' a very valuable work, but which is, I believe, in the hands of but few British botanists. The plant had indeed only been met with by Bunge in Northern China, in 1831, and the Filices not being included in the list of his plants published at St. Petersburg in that year, it had remained so obscure that it was apparently un-

known even by name to the majority of pteridologists, and was unnoticed in Sir W. Hooker's 'Species Filicum.'

In October, 1861, I gathered on the walls of the city of Canton, growing in the interstices of the bricks, an exceedingly pretty little *Adiantum*, which I at once decided to be new, and described in the Paris 'Annales des Sciences Naturelles' (4th ser. xv. 229), under the name of *A. Cantoniense*. The late Sir W. Hooker, in acknowledging specimens I had sent him, observed of this (in a letter dated 2nd January, 1862):—"I may say certainly that it is new. I have compared it with all in my herbarium which have any sort of similarity with it. It is brother to *A. lunulatum*, as you observe, but abundantly distinct."

In the summer of 1866, my friend Dr. S. W. Williams, Secretary to the United States Legation at Peking, collected in dry places on the hills lying to the west of that capital, very beautiful specimens of a Fern quite identical with the Canton one; and this circumstance causing me to inquire what species had been recorded from Peking, led to the conclusion that *A. Cantoniense* is a mere synonym of *A. Capillus-Junonis*. The Peking specimens have the rachis very frequently not prolonged beyond the pinnæ, but this is also often the case in the southern plant, and the comparison of numerous individuals from various localities in the province of Kwangtung leaves no doubt whatever of their identity.

Adiantum Guilelmi, n. sp.; cæspitosum, semipedale, præter partem inferiorem stipitum tenuium ebeneorum parce paleaceam undique glaberrimum, frondibus lineari-lanceolatis apice nec nudis neque radicantibus, pinnis alternis brevissime petiolatis 3–5 lineas longis tenuiter membranaceis subtus guttulis flavidis glandulosis parce conspersis subprominulo-venosis dimidiato-oblongis obtusis basi superiore truncata rachi parallela sterilibus magis conspicue et oblongo-fertilibus obscure et truncato-lobatis, lobo rachi proximo disoro, reliquis monosoris, soris oblongis approximatis.

In umbrosis agri Pekinensis, rarissime crescentem detexit Dr. S. W. Williams, æstate 1866. (Exsicc. n. 13483.)

This neat and rare little Fern, of which I have only seen a solitary specimen, seems quite distinct from any hitherto described; and nearest to *A. Edgeworthii*, Hook. The best idea of it I can give is that it looks much like *A. pedatum* dwarfed, simply pinnate, and with the

pinnæ smaller; it dries of a deep vivid green. I have dedicated it to its accomplished discoverer.

Asplenium (Euasplenium) Pekinense, n. sp.; stipitibus $1\frac{1}{2}$–$2\frac{1}{2}$-pollicaribus tenuibus glaberrimis viridibus paleis fuscis deciduis tectis cum rachibus compressis marginatisque, frondibus 4–6 pollices longis subcoriaceo-membranaceis lanceolatis bipinnatis v. sursum bipinnatisectis, pinnis primariis a medio apicem basinque versus decrescentibus 7–11 lineas longis deltoideis subapproximatis patentibus inferis magis distantibus deflexis, pinnulis cuique pinnæ 6–9 cuneatis pinnatifidis v. incisis subtruncatis lobis apice 2–3-dentatis dentibus setaceo-apiculatis, venis furcatis, indusiis in utraque pinnula 1–6 albidis teneris linearibus margine erosulis costulis approximatis sæpe scolopendrioideis.

In ditione Pekinensi, æstate 1865, collegit Dr. S. W. Williams. (Exsicc. n. 12404.)

I at first considered this pretty little Fern to be allied to *A. Mertensianum*, Kze.; but the late lamented Professor Mettenius, to whom I communicated specimens, whilst acknowledging it to be "a distinguished new species," pointed out that its chief relationship was with *A. varians*, Hook. and Grev. (Icon. Fil. t. 172), adding that he had seen in the Hookerian herbarium an undescribed Japanese Fern still nearer the latter. I have since received from my ever liberal friend Dr. Thwaites, a specimen of *A. varians*, and I entirely acquiesce in the decision of the eminent pteridologist whose death is so great a loss to science; but, in my judgment, *A. varians* and *A. Mertensianum* are separated in his arrangement by too great an interval.

NOTICE OF *BUXBAUMIA INDUSIATA*, *Brid.*, IN ABERDEENSHIRE.

By G. Dickie, M.D.

In July, 1847, two specimens of a *Buxbaumia* were found in a wood near the village of Ballater, in Aberdeenshire. Mr. Alexander Cruickshank, who gathered them, gave me one which was placed in my herbarium as *B. aphylla*. Some months ago, at a meeting of the Edinburgh Botanical Society, it was reported that an immature specimen of *B. indusiata*, Brid., had been found in Ross-shire. This report led me to re-examine Mr. Cruickshank's plant, which differed in general ap-

pearance from the true *B. aphylla.** I had now no doubt that Mr. C. was the discoverer of *B. indusiata* in this district. On 24th May last I visited the place, but failed to find any trace of the plant; a few weeks later, Mr. C. and Mr. Roy were equally unsuccessful; the original station was in an old wood of Scotch Fir, which was cut down a few years ago, and the surface thus very much altered. It then occurred to me that near the village of Aboyne, where decayed stumps and prostrate stems of Fir are plentiful, the *Buxbaumia* might probably be found. Accordingly, in company with Mr. John Roy, a very diligent muscologist, I went to the place; we had searched but a short time, when Mr. Roy found a few specimens on a prostrate stem; further search yielded in all eleven specimens, some of which were imperfect. On the 29th of July, I revisited the locality, and found on one decaying stem of Fir eleven setæ, some with and some without fragments of capsules, and one perfect specimen, the largest of all as yet gathered here.

This very fine and rare species will doubtless be met with in other places; at Aboyne it occurs on rotten stems of *Fir*, in moist spots shaded by the common Brake Fern.

AN EDIBLE TAHITIAN FUNGUS.

Mr. Brander, a well-known merchant, resident in Tahiti, supplies us with the following note on the edible Fungus of that place. We regret that the specimens promised us have, as yet, not been received, but we are yet in hopes of receiving them. Quantities of this fungus are often sent to Sydney. Mr. Brander writes:—"What is called 'fungus' in our export list, is an article of commerce found in the islands of the South Pacific, principally the Society and Leeward Islands, on decayed trees. The Tahitians call it 'Teria iore' (*i. e.* 'rat's ear') from a certain resemblance of the shape of the plant to the ear of a rat. The Fungus first began to be collected in 1863, and fetches in China, where it is much esteemed, and made into soups, from eighteen to twenty cents per pound."

* It may be necessary to state that vol. ii. of Hooker's 'British Flora' was the only authority accessible at the time; in that work *B. indusiata* is given as a synonym of *B. aphylla*.

ON THE PLANTS CULTIVATED OR NATURALIZED IN THE VALLEY OF CARACAS, AND THEIR VERNACULAR NAMES.

By A. Ernst, Esq.

Phytogeographical data:—Caracas, 10° 30′ 50″ N. lat.; 66° 55 W. of Greenwich. 2921 feet (English) or 890·3 metres above the level of the Caribbean Sea. Soil rather poor, little irrigated by a few small rivers (Guaire, Caroata, Anauco, Gamboa, Catuche, Tocumé).

Meteorological Elements, 1860.*

Month.	Thermometer. Centigr.	Thermometer. Fahren.	Barometer. French mm.	Barometer. English	Hygrom. Sauss.	Rain. metres.	Rain. inches.
January	20·71	69·28	684·55	26″11·52	71·64	0·004	0·16
February	20·20	68·36	684·85	26 11·66	66·00	0·000	0·00
March	20·80	69·44	684·41	26 11·45	72·70	0·017	0·67
April	23·34	74·01	684·66	26 11·57	73·10	0·085	3·35
May	23·27	73·88	685·16	26 11·80	68·00	0·012	0·47
June	22·45	72·41	684·93	26 11·71	68·65	0·093	3·66
July	22·40	72·32	685·06	26 11·76	72·80	0·113	4·45
August	22·57	72·62	684·65	26 11·56	75·90	0·111	4·37
September	22·50	75·50	684·45	26 11·47	76·40	0·206	8·12
October	22·28	72·10	684·20	26 11·36	76·90	0·142	5·59
November	21·22	70·19	684·01	26 11·26	76·50	0·096	3·78
December	21·32	70·37	684·53	26 11·51	73·85	0·002	0·08

Mean temperature, 21·92° C. or 71·45° F.
Mean barometer, 684·63 mm. or 26″ 11·55.†
Mean degree of humidity, 72·70° (Hygrom. Saussure).
Quantity of rain in 1860, 0·881 m. = 34″ 8·5‴.‡

I. Cultivated Plants.§

A. *Plants cultivated on account of their roots, bulbs or tubers.*

Solanum tuberosum, L.—The Quechua name of the plant, 'papa,' is now used in all Hispano-American countries. The 'Papa criolla'

* Anuario de Observaciones de la Oficina central del Colegio de Ingenieros de Venezuela para el año de 1862. Caracas, 1861, p. 173.

† The English barometer has been calculated from the French one, with the tables published by Mr. F. F. Tuckett, in the 'Reader,' December, 1864, p. 740.

‡ Nearly the same quantity as in Liverpool (0·874 m. = 34″5·2‴). Conf. Mueller, 'Kosmische Physik,' 1856, p. 411.

§ I have followed the arrangement adopted by Alphonse De Candolle in his classical 'Géographie Botanique Raisonnée,' Paris, 1855, 2 vols. 8vo.

(tubers egg-shaped, inside yellowish and very mealy; peel very thin, reddish; buds deeply sunk into the tuber and very numerous), cultivated formerly in the valley of Caracas, has now disappeared completely, partly destroyed by the murrain, partly lost by the carelessness of the cultivators, who did not keep up the pure stock. It was probably of New Granadian origin. The potato, cultivated at present, is derived from North American or German seedlings, but it suffers much from the murrain. Mosquera, in his 'Compendio de Geografia de los Estados Unidos de Colombia,' London, 1866, p. 38, mentions a wild species of *Solanum*, which he takes for the true *tuberosum*, in the mountains of the upper valley of the Cauca, in the country of the Coconuco Indians. It has no tubers, or at least very few, but, when cultivated, it produces the best varieties of potatoes. ("Cultivada esta planta, se obtienen las variedades de patatas hasta las mas buenas que se conocen.")

Manihot utilissima, Pohl.—One of the original bread-yielding plants of this country, and even to-day abundantly cultivated under the Haytian name 'Yuca.' I have carefully examined the different varieties cultivated in the valley of Caracas, and found them to belong all to *M. utilissima*, Pohl ("ovario alternatim inæqualiter 6-gono glabro, capsulis inæqualiter anguste alatis, alis undulato-subcrenatis," Dr. Müller-Arg. in De Cand. Prod. xv. 1064). The poisonous varieties are called 'Yuca amarga,' in opposition to the 'Yuca dulca,' or 'boniata.' It appears from a curious passage in Oviedo (Sumario de la Natural Historia de las Indias, ed. Rivadeneyra, in Bibl. de Aut. Españoles, tom. xxii. p. 477), that the latter was exclusively cultivated on the mainland ("en Tierra Firme toda la yuca es de esta boniata"). There are several forms of 'Yuca dulce,' of which I add a diagnosis:—

I. Stems and leafstalks reddish.
 a. Broad-leaved (leaflets at least 1 inch broad); lateral nerves forming an angle of 60 to 65 degrees with the principal nerve; sinus between the leaflets open.
  α. Leaves obovate-acuminate. *Yuca algodona.*
  β. Leaves elliptical-acuminate. *Y. negrita.*
 b. Narrow-leaved (leaflets seldom more than ½ inch broad); lateral nerves forming a nearly *right* angle with the principal nerve; leaflets on the basis touching or even overlapping each other, sinus therefore not open. *Y. caribita.*

II. Stems and leafstalks not reddish. *Y. blanquita.*

The 'Y. algodona' and 'caribita' are the most common forms. The latter name is taken from that of the Caribs; the first refers to the snowy, cotton-like appearance of the interior of the cooked root. There is but *one* form of 'Y. amarga' cultivated, resembling so much the 'Y. algodona,' that I looked in vain for some valuable distinctions. The number of leaflets is by no means a trustworthy character; leaves with 3, 5, and 7 leaflets, being always found together on the same plant. The younger leaves have generally the lesser number of leaflets; they are always odd.

Colocasia esculenta, Schott (var. *α. alba*, Seem. Bot. Her. 212).—Little cultivated under the name 'Ocumo.' This is a Cumanagoto word (a language belonging to the Caribbean family), found also in local names, as 'Ocumare' (from Ocumuuar, a place where the 'Ocumo' grows abundantly). The Asiatic origin of 'Colocasia' cannot be doubted, considering the facts brought together by Alphonse De Candolle (Géogr. Bot. 817). It was known in Spain, at the time of the American Conquest, under the name of 'Alcolcaz.' Now, as it certainly has been brought to Venezuela by the Spaniards from Spain, it seems strange that there is no trace whatever of the name known to the introducers. But I think this can easily be accounted for. The fleshy underground stems of *several* Aroideæ, when roasted, become eatable. It is therefore highly probable that the Caribs used already an *indigenous* species, under the name 'Ocumo,' and that this name was afterwards transferred to Colocasia, which was principally cultivated by the slaves for their own use, and very little esteemed by the Spaniards, so that these did not care for conserving the true name. The Spanish names of European plants have been very often transferred to Venezuelan plants, on account of some real or fancied congruency in form or properties. Why should the reverse not have taken place?

The name 'Colocasia' (or 'Colcas') may be found in the island of Jamaica, where the plant is called 'Coco' (Brown, Jam. p. 332; Lunan, Hort. Jam. i. 211); even the Polynesian name 'Taro' or 'Tallo' is recognisable in 'Taya,' the name of a variety cultivated in the same island (Lunan, i. 212).

Dioscorea.—We cultivate *D. aculeata*, L., and *D. alata*, L. (var. *α.* Stem 4-winged; tuber simple; Griseb. Flora of the Brit. West. Ind. Isl. 587) under the name of 'Name de raiz,' and *D. bulbifera*, L., under the name of 'Namé de mata,' but the latter is uncommon. A

variety of *D. aculeata*, generally with a throughout bluish-violet tuber of very delicate taste, is known under the name of 'Mapuey.' Oviedo (Sumario, p. 506) mentions 'Ajes' (the Haytian name of *Dioscorea*), distinguishing them clearly from the Batatas ("Hay otras plantas que se llaman Ajes y otras que se llaman Batates"). Of the former, he says, "Tiran á un color como entre morado y azul." This agrees perfectly well with the Mapuey, so that, following Oviedo, the first writer on American plants,* this variety *would be indigenous in the New World*. Caulin (Hist. de la Nueva Andalucía, Carac. 1841, p. 20) mentions another form under the Caribbean name 'Piricha,' comparing it with the Mapuey; but I have found no other information about this plant. In the Spanish island of Portorico, a species (which one?) of Dioscorea is known under the name of 'Gunda,' which certainly is not of American origin.

Batatas edulis, Choisy. 'Batata.'—Very extensively cultivated in four or five varieties. *B. fastigiata*, Sweet (Griseb. Flora, 468), is not uncommon in the valley of Caracas. Is this really a species established on trustworthy characters? The little difference in the relative length of the peduncle and the *generally* twining habit are scarcely sufficient reason for its being considered as a separate species. I found it *always* in the neighbourhood of batata-fields; the root bears rather small tubers, and the whole plant looks more like a degenerated form of *B. edulis*.

Canna edulis, Ker. 'Capacho.'—A plant of scarcely any agricultural importance, and now very seldom cultivated. The name appears to be of Quichua origin, from 'Ccapac-Achira,' *i.e.* tall 'Achira,' this being the name of various species of *Canna* in Peru. (See Clements R. Markham, 'Contributions towards a Grammar and Dictionary of Quichua,' London, 1864, *sub voce* Achira.)

Raphanus sativus, L. (*radicula*). 'Rúbano.'—Grows very well.

Brassica campestris, L., and *B. Napus*, L. 'Nabos.'—Little cultivated, principally by German settlers.

Daucus Carota, L.—The vernacular name 'Zanahoria,' used in all countries where Spanish is spoken, is taken from the Basque language, and means, after Larramendi, *yellow root*. This language

* The first edition of the 'Sumario' was published 1526, in Toledo, under the title, "Tratado de la Natural Historia de las Indas (*sic !*); se imprimió á costas del autor por industria de maestre Remo de petras" (54 leaves in fol. Goth. letters).

being one of the oldest in Europe, the cultivation of carrots in Spain must be anterior to the invasion of the Roman element. The Greeks cultivated the plant under the name Σταφυλῖνος (Unger, Bot. Streifzüge); the Romans called it *Carota* (Latin or Latinized?—the 'carruca' in Charlemagne's Cartularies appears to be the same word). Most of the other European names are taken from the yellow colour of the root. The wild plant is common all over Europe and part of Asia; but its cultivation appears to be nowhere older than in the Iberian peninsula. Carrots are not much cultivated in the neighbourhood of Caracas; they grow, nevertheless, fine roots when some care is taken. The 'Flora Caracasana' contains another indigenous species of the same genus,—*D. torriloides*, DC. (Prod. iv. p. 214, n. 29), called 'Bisnaga' or 'Visnaga.' This name is said to be in Pliny; its etymology is obscure.

Arracacha esculenta, Bancr.—Extensively cultivated under the name 'Apio,' which originally means Celery. There is indeed a remarkable likeness between the leaves of both plants. For the same reason *Sanicula crassicaulis*, Pœpp. (De Cand. Prod. iv. p. 84. n. 6), a very common plant in our mountain ravines, is called 'Apio de montaña.'

Allium Cepa, L. ('Cebolla'), and *A. sativum*, L. ('Ajo').—Both extensively cultivated; the latter especially being a highly esteemed condiment in Creole cookery. Both plants are certainly introduced from Europe. Humboldt's quotation from Cortez, which would prove the contrary, is of no value, as Cortez is nothing less than exact with the few names of plants he mentions in his letters. The original passage runs thus:—"Hay todas las maneras de verduras que se fallan, especialmente cebollas, puerros, ajos, mastuerzos, berros, borrajas, acederas y cardos y tagarninas" (Don Fern. Cortez, Cartas de Relacion, ii. carta, in Bibl. de Aut. Esp., ed. Rivadeneyra, tom. xxii. p. 32). Alphonse De Candolle (Géogr. Bot. 829) mentions already the positive statement made by T. Acosta, as to the European origin of the Leek cultivated in Peru. I add another, from Franc. Lopez de Gómara (Hist. de las Indias, in Bibl. de Aut. Esp., ed. Rivad. xxii. p. 177), "Todas las yerbas de hortaliza que lleváron de acá" (that is "which were taken away from here," Gómara wrote his work in Spain,) "se hacen muy lozanas, y tante que no granan las mas, como son rábanos, lechugas, *cebollas*, perejil, berzas, zanahorias, nabos y con-

gombros." (The first edition of Gómara's 'Historia' was published in Zaragoza in 1552; Acosta's work in Sevilla in 1590.)

Beta vulgaris, Moq.—Little cultivated, under the name 'Remolacha.' Fr. Diez (Etymol. Wörterb. ii. p. 169) refers this word to the Latin *armoracia*, Italian *ramolaccio*, which, however, is another plant. Our plant was formerly called 'Acelga remoracha' (Terreros, Diccionario Castellano, Madrid, 1786), the first word being a contraction of *Beta Sicula;* the second, an adjective, which might be *re-mo racho*, *i.e.* very purple.

Celery ('Apio de España') is cultivated in some gardens, and thrives pretty well; it wants, however, much care and good manuring.

Parsley ('Perejil') is grown as a potherb, but the roots remain always thin and woody.

B. *Plants cultivated on account of their Stems.*

Fourcroya gigantea, Vent., 'Cocuiza mansa' (*i.e.* tame, as the leaves have no spines), and *F. Cubensis*, Haw., 'Cocuiza brava' (savage, the leaves being coarsely spinose-dentate; the spines are generally geminate, united at the base, but with separated and oppositely directed points).—The giant flower-stem of both species is called 'Maguey.' Indigenous in the mountains of Caracas, but also cultivated for making impenetrable fences. The fibres of the leaves are wrought into cordage, which is known under the names of 'Mecate,' 'Pita,' and 'Cocuiza' (the first of Aztec, the second and third of Haytian origin). *Agave Americana*, L. ('Cocui'), common in the Tierra Caliente, is used in the same manner.

Saccharum officinarum, L. 'Caña dulce.'—Until 1796 but two kinds of sugar-cane were cultivated in Venezuela,—'Caña morada' (*S. violaceum*, Tussac) and 'Caña criolla' (*S. officinarum*, var. *α. commune*). In the year mentioned, the 'Caña de Otaíti' (*S. officinarum*, var. *β. Tahitense*) was introduced from Trinidad. Although the import of all sugar-cane productions is prohibited in Venezuela, the cultivation of the cane in general is far from being flourishing.

C. *Plants cultivated on account of their Leaves.*

1. *Forage.*

Zea Mays, L.—Indian corn is, in this country, the staff of life for man and beast. When the grain is the object of cultivation, five or

six seeds are put together in one hole; when the plant is to be used as food for horses, mules, etc., from eight to ten seeds, so as to give more stems. These plants, cut before flowering, are called 'Malojo.' This very extensive branch of agriculture is generally in the hands of immigrants from the Canary Islands ("Isleños").

2. *Vegetables.*

Brassica oleracea, L. (var. *capitata*).—The vernacular name 'Repollo' is derived from *repullulare*, because the plants make fresh buds in winter. (So Diez, Etym. Wörterb. ii. p. 169.)

Lactuca scariola, var. *sativa*, Moris. 'Lechuga.'—It does not form compact heads.

Spinacia oleracea, L. 'Espinacas.'—Seldom cultivated.

3. *Leaves employed for various purposes.*

Nicotiana Tabacum, L. 'Tabaco.'—The immediate neighbourhood of Caracas produces very little tobacco, but in the province of Cumaná a considerable quantity is grown. The once so famous tobacco of Barinas is now scarcely cultivated; the endless civil wars of this country having been very fatal especially to that province. The tobacco plant seems to become perennial under favourable circumstances. A specimen, growing in the front yard of the former German club-house, in Caracas, assumes the appearance of a small tree. Its stem is 2 inches thick, and over 6 feet high; the crown resembles that of a young Cherry-tree, and is 15 feet in circumference. The same plant flowered in 1866 for the *third* time. I have taken flowers and capsules both from the first and from the second bloom, and found the species to belong to the variety *β. macrophyllum*, of *N. Tabacum*, L. (conf. De Cand. Prodr. xiii. 1. 557).

Indigofera tinctoria, L., et *I. Anil*, L. 'Añil.'—Until 1777, the latter species only was known in Venezuela. It is believed to be indigenous; but this is at least not certain, there being neither any positive evidence of its existence in the country before the Spanish Conquest, nor is there any other name besides *Añil*, which is of undoubtedly Eastern origin. In 1777, D. Ant. Arbide, then Capitan-General of Caracas, introduced the *I. tinctoria* from Guatemala, and Pablo Orrendain established the first indigo plantation in the valleys of Aragua (Yanez, Hist. de Venezuela, p. 47 note). The indigo from Caracas

was of excellent quality, and fetched high prices in Europe. This branch of industry was principally in the hands of the numerous Basque settlers; but these being for the greatest part royalists, they suffered very much during the war of independence. Many were killed, others left the country or were ruined, and in consequence, the cultivation of indigo declined rapidly. It was afterwards taken up by men without skill and experience, who prepared so inferior an article, that Caracas indigo now has lost all credit in commerce. But the two species of *Indigofera* continue to grow independently, and may be considered as naturalized. *I. subulata*, Vahl, is the only truly indigenous species in the valley of Caracas.

D. *Plants cultivated on account of their flower-buds.*

Brassica oleracea, L. *Botrytis cauliflora*, De Cand. Syst. Nat. ii. 586. 'Coliflor.'

(*Humulus Lupulus*, L. 'Flor de Cerveza.'—The cultivation has been tried, but as yet without any result, because not in the right way.)

E. *Plants cultivated on account of their fruits.*

Anona squamosa, L. 'Anon.' *A. muricata*, L. 'Guanábano' (in Cumaná 'Catuche'). *A. reticulata*, L. 'Riñon' (*i. e.* kidney, on account of the shape of the fruit). *A. Cherimolia*, Lam. 'Chirimoya.' *A. Manirote*, H.B.K. (?) 'Catigüire.'

None of the Anonas are indigenous in the valley of Caracas. They are even rarely cultivated as they require a warmer climate. *Anona Cherimolia* appears to be the hardiest. The word 'Anon' is Caribbean. 'Guanábano' is from the same language, and seems to be a compound word, 'Yuana-anon,' or 'spiny anon.' The name 'Catuche,' used in Cumaná, reminds of 'Cape Catoche,' in Yucatan; there is also near Caracas a small river 'Catuche,' and in Georgia (U.S.) a river 'Chattahouchee.' All these names show a striking likeness, and belong probably belong to the same root. The introduction of the Guanábano into Venezuela seems to be of a comparatively recent date, as Fr. Ant. Caulin (Hist. de la Nueva Andalucía, written in 1766) mentions but Anon, Rinon, and Chirimoya. This last name is evidently Quichua, meaning, after Garcilaso de la Vega, "fruta de semilla fria," probably on account of its growing in the Tierra Fria. Huanaco, in Peru (in 5000 feet over the sea), is still to-day famous for its Chirimoyas. The

'Catigüire' (a Cumanagato word) is seldom cultivated, and of no great value, the yellow pulp of the large fruit being very indigestible. I believe it to be the *A. Manirote*, H.B.K., and as this figures amongst the "Anonæ non satis notæ," I beg leave to add the following description:—

Anona Manirote, H.B.K.—Arbor 30–40-pedalis; *foliis* oblongo-ellipticis basi truncatis subinæqualibus apice abrupte acuminatis, supra glaberrimis nitidis, subter pallidioribus, venis supra leviter impressis subter valde prominentibus pilosis (foliis novellis omnino propemodum sericeo-pilosis), margine siccitate subrevolutis, 5–7 poll. long. 2–3 poll. lat., petiolo 3–4 lin. longo; *floribus* solitariis axillaribus et terminalibus brevissime pedunculatis; *sepalis* tribus minutis sericeo-tomentosis; *petalis exterioribus* triangularibus longe acuminatis ($2\frac{1}{2}$ poll. long., supra basin pollicem fere latis) crassis, extus dense aurantiaco-sericeis, intus roseis luteo-marginatis; *petalis interioribus* apiculatis imbricatis sesquipollicaribus 9–10 lin. latis, extus tenuiter pilosiusculis aurantiaco-roseis, intus roseis; *staminibus pistillis*que ut in genere; *fructus* ovoideo-globosus, capitis humani magnitudine, aculeis innocuis inflexis (ut in *A. muricata*, L.), in maturitatis statu luteus, carne lutea dulcissima, semina crebra fusca pollicem longa et ultra.

Citrus Aurantium, Risso, 'Naranjo dulce,' and *C. Bigaradia*, Duham., 'Naranjo amargo.'

Both are frequently cultivated. Macfadyen (Fl. Jam. p. 129) says that the seeds of sweet oranges produce very often the bitter orange-tree, and Duchassaing (Grisebach, 'Vegetation der Karaiben,' p. 34) states equally, "se a seminibus *Aurantii dulcis* arbores fructus amaros proferentes vidisse idque incolis (ins. Guadeloupe) satis notum esse." In Caracas we distinguish the 'Naranjo agrio' (sour) and the 'Naranjo amargo' (bitter), the first being a degenerated form of *Citrus Aurantium*. Its fruit *es agrio* (the auxiliary verb denoting an essential quality), whilst the fruit of the sweet orange-tree sometimes *está agrio* (the auxiliary verb denoting an accidental quality). I have been told very often that seeds of sweet oranges produce in some places, and under certain circumstances, trees with *sour* fruits (*naranjas agrias*), but never with *bitter* fruits (*naranjas amargas*). This agrees very well with the observations of Gallesio, and confirms the opinion of Alph. de Candolle (Géogr. Bot. p. 866, note).*

* We know the exact date of the introduction of oranges in Mexico. Bernal

There are further cultivated in the valley of Caracas—'Cidra,' *Citrus medica*, L.), 'Limon agrio' (*C. Limonum*, Risso), 'Limon dulce' (*C. Limetta*, Risso), with the two varieties 'Lima' and 'Limaza,' 'Toronja' (the Catalonian form of the word 'naranja'), most probably a hybrid form from *C. Decumana* and *C. Bergamia*, and 'Martinica,' nearly related to *C. Decumana*, Willd. *Triphasia trifoliata*, DC. ('Limoncillo'), is uncommon. *Citrus spinosissima*, Mey., is used for making fences (neighbourhood of Turmero, valleys de Aragua). This species is considered by Humboldt as of American origin (Ess. Pol. Cuba, Span. transl. p. 56, and Ess. Pol. Nouv. Esp. iii. 147, ed. 1811), but this is not yet fully proved. No other species of *Citrus* is American, and, as far as I know, no indigenous species is mentioned by the earlier writers on the plants of the New World. Another Aurantiacea, *Murraya exotica*, L. ('Azahar de las Indias'), is very common in gardens as an ornamental plant.

Mammea Americana, L. 'Mamey.'—This handsome tree does not grow well in the valley of Caracas; it wants a higher temperature. In the Tierra Caliente, the fruit reaches sometimes 5 to 6 inches in diameter. The name is of Haytian origin.

Vitis vinifera, L. 'Uva de Parra.'—The Grape-vine can be cultivated, and produces in some years most excellent grapes. But as a general rule, we are not in a wine-land; the heavy rains, which just begin when the plant is in flower, make the result very problematical. The grape-vine disease is now very common.

Anacardium occidentale, L. 'Mercy' in Caracas, 'Tauji' in Portorico, 'Marañon' in Cuba, Panamá, New Granada, and Ecuador.—These different names, as well as the English Cashew (from 'Acaju'), seem to prove that Brazil, probably the Valley of the Amazons, is the true native country of the tree. No mention is made of the *Anacardium* in any of the Spanish authors on the American Conquest, and in this case the negative proof is rather important, as it would be impossible to overlook so remarkable a tree, especially when in fruit. Caulin's statement, "Se cria silvestre en muchas partes de estas provincias de Cumaná, Guayana é isla de Trinidad" (Hist. d. l. Nueva Andal. p. 22), embraces probably too much.

Diaz (Hist. de la Conquista, cap. 17) says that he planted in Coatzacualco 7 or 8 grains, and adds:—"Estos fuéron los primeros naranjos que se plantáron en la Nueva España." This was in 1528.

Mangifera Indica, L. 'Mango.'—The Asiatic origin of this tree is a well-known fact.

Fragaria vesca, L. 'Fresa.'—Cultivated in gardens, but also completely naturalized, and so common in the higher mountains, Galipan, etc., that considerable quantities of the fruits are brought to town. I was not fully convinced of its being introduced until in March, 1866, I had the opportunity of seeing in another part, Las Lajas, on the road from Caracas to the valleys of Aragua, 6000 feet over the sea, large tracts of ground overrun with strawberries, learning at the same time from my hospitable friend Señor Rafael Lizarraga, the owner of the place, that all these strawberries were the descendants of a small number of plants introduced there by his own father some forty years ago. The strawberry was introduced in Venezuela by D. Gerardo Patrullo, at the end of the past century.

The name 'Fresa' (Fr. *fraise*) is derived from the Lat. *fraga* (Virg. Ecl. iii. p. 92, "humi nascentia fraga").

Amygdalus Persica, L. ('Durazno,' from *duracina*, the name of a variety mentioned by Pliny.)—There are two other Spanish names mentioned by Ortega ('Tabulæ Botanicæ,' Matriti, 1783, p. 159), 'Abridor' (from *abrir*, to open, on account of the aperitive properties of the peach), and 'Prisco,' doubtless derived from *Persica*, and proving sufficiently that the Slavonic names given by Alph. de Candolle (l. c. 883) are nothing else than corruptions of the same Græco-Roman word. The Peach-tree remains in Caracas generally a shrub; the fruits are small and not very tempting, and commonly used in sweetmeats.

Pyrus Malus, L. 'Mansano,' formerly *mazana* (the fruit), in Portuguese *mazãa*; after Diez, from *Malum Matianum*, a kind of apple named after some one (Etym. Wörterb. ii. p. 148).—We have no apple-*trees*, but apple-*shrubs*, with a fruit which, only when cooked with sugar, becomes eatable. Pears are a mere curiosity in some gardens; the handsome tree remains a dwarfish shrub, which seldom lives longer than four or five years.

Cydonia vulgaris, L.—Cultivated frequently, as the fruits yield an excellent jelly. The Spanish name 'Membrillo' is derived from *melimelum*, literally honey-apple, because quince-jelly was formerly prepared with honey. The tree remains small, and grows but in the higher part of the valley (Macarao, Petaquire).

Punica Granatum, L. 'Granada.'—It is the variety *nana*.

Jambosa vulgaris, DC. 'Pomaroso,' on account of the shape and smell of the fruit.—Alph. De Candolle (l. c. 893) seems to doubt whether *J. vulgaris* is cultivated in America, as Maycock refers the Rose-apple of Barbadoes to *J. macrophylla*, DC. I cannot decide whether this be right or wrong, but the 'Pomarosa' of Venezuela (and probably of most American countries) is certainly *J. vulgaris*, DC., as described in the Prod. iii. p. 286. The tree is very common near Caracas, but the fruit not much esteemed.

(To be concluded in next number.)

NOTE ON *PENTHORUM CHINENSE*, *Pursh.*

By H. F. Hance, Ph.D., etc.

In the month of September, 1866, Mr. Sampson and myself discovered this plant at 'Ng-ngá-hau, about eight miles above Canton, growing under the shade of *Glyptostrobus* trees, in the muddy bed of the river, and often almost entirely submerged. This is, I believe, the first record of its being met with in the south of the Empire, for Sir George Staunton's specimens were probably collected in the north,* and in recent times it has only been found in North China, Manchuria, along the Ussuri, and in Japan.

Notwithstanding that such very high authorities, and so little disposed to multiply species as Mr. Bentham and Dr. Hooker, in the 'Genera Plantarum,' and Dr. Regel (Tent. Fl. Ussur., 65),—the latter, however, giving no other constant character than the narrow leaves,—hold this to be distinct from *P. sedoides*, I do not hesitate with Professors A. Gray (on the Bot. of Japan) and Miquel (Ann. Mus. Lugd. Bat. ii. 76) to look on it as merely a geographical variety of that species. The seeds of my specimens, which really look like small raspings or filings, and are hence, notwithstanding Miquel's objection, well described by the term *scobiformia*, are yellowish, oblong, straight or curved, acute at both ends or rounded at one, angular, so that a transverse section would usually show a trigonous figure with one convex and two plane faces, and muriculate on the surface. Hence, it is clear that these do not furnish the characters relied on for the discrimination of the Asiatic plant. The South-Chinese examples, with apetalous or 1–5-petalous flowers, agree perfectly with Regel's plate

* The specimens in Herb. Mus. Brit. are from the "Province of Kianang."—Ed.

(op. cit. t. vi. f. 1-2), and are distinct enough in appearance from the Atlantic species, the leaves being half as long again, lanceolate-linear instead of elliptic-lanceolate, and with the primary veins less arcuate (often quite straight) and connected at some distance within and parallel to the margin by a rather conspicuous nerve.

In typical *P. sedoides* these veins are much arched, and anastomose by a series of curves, not distinct, unless the leaf is held up to the light.

THE STAPLE PRODUCTS OF JAMAICA.

Sugar.—Three hundred estates in cultivation make about 30,000 hogsheads.

Coffee.—This is increasing in quantity, on account of the small settlers growing it.

Arrowroot.—Decreasing in quantity.

Ginger.—But little cultivated.

Sago is grown in small quantities for domestic use. It is made from the small knobs or offsets growing at the base of the stem of *Cycas circinalis*, and not from a *Zamia*, although it also produces Sago.

The common Coco, *Caladium esculentum*, and Bitter Cassava, *Jatropha Manihot*, produce 18 per cent. of fine Starch, by grating them. *Canna edulis* has within the last four or five years come into cultivation. There are two sorts; one has a coloured leaf, the other cannot be distinguished from the common Indian Shot. *C. Indica*, the green-leaved var., is the best. This produces the "Tous les Mois" of the French.

Indian Corn is grown but sparingly, not sufficient to supply the wants of the island. It is imported from N. America in quantity, as well as all corn meal, which is retailed at 3*d.* to 4½*d.* per quart.

All our Meal-stuffs come from America, also corn, and salt provisions, such as fish, herrings, mackerel, pork, very bad beef, etc., and sugar-cured hams.

The common staples in daily use among the people are Cocoas, Yams, Cassava, Banana, and Plantains. It is well known that there is not a staple or cultivated plant indigenous to the island, with exception of the Pine-apple. As for Cocoa-nuts, no one knows whence or when they came. The only plants imported during my time, available or cultivated, are the Chinese Banana, *Canna edulis*, and Sappan-wood of commerce. This latter is one of the most valuable introduc-

tions, as it arrives at maturity in twelve or fifteen years, reproduces itself the second year, and when cut down for market, throws up from the stool strong shoots of some ten or twelve feet long. The Cam-wood, although three times as valuable, does not seem to thrive well out of Bath, and requires attention at first.

The Chinese Grass cloth, or Rheea fibre of India (*Bœhmeria nivea*), is likely to become useful; inquiry is now being made, by the Home Government, as to any likelihood of its successful culture here, and I have answered every inquiry in full as to its free and luxurious growth in all moist and warm localities, producing two crops of shoots 8 or 10 feet in height a year, suitable for the production of fibre. It was sent out in 1854, and has since been largely distributed, but no one will individually take up the cultivation, so that after I have had twelve years' experience in growing this plant, and having brought it to the notice of the world time after time, I regret to find that it has been all of no use. Now the Americans have found out its high value, and are successfully using it in textile manufactures at Bradford, paying as much as £70 or £80 per ton for it, and this has brought it to the notice of the English Government. This is just the climate for it, above all others, and they need not go further to try experiments; but probably this, like other things, will be lost sight of. I once received a specimen of this fibre cleaned in London, and which was sold at 2*s*. 6*d*. per lb., equivalent to £280 per ton. I mentioned this in my reply just sent in, and I think the machinery that cleaned it is in the possession of Mr. Sharp, who made such a stir about our fibres some years ago. I think I have proved to the world the superiority as well as quantity of our fibre-producing plants, by the receipt of four medals awarded at the various International Exhibitions.

The *Clove* was growing well until one of the great floods swept it away; it has lately been introduced from Trinidad.

The *Chocolate* (*Theobroma Cacao*) is quite at home; it bears the third year in a congenial climate and soil,—that is, free porous soil, and a rather moist and warm climate, well sheltered. There is not much of it grown, not even so much as to supply the island consumption. The rats are very destructive to it, and bats also; they are fond of the sweet pulp surrounding the seeds. I have an acre of it here, but the rats prevent me getting any practical benefit from it.

Black Pepper was introduced and throve well, but has been lost even after a free distribution of plants.

The *Nutmeg* thrives well here, particularly where the Chocolate thrives; there were no plants distributed until some years after I came here, and those sent out have borne freely; there is one tree in this garden which produces regularly about 2000 fruits per annum. This tree bears or ripens its fruit in May and June, and again in October and November, two crops a year; from 150 to 200 plants are distributed annually gratuitously. The negroes steal half the fruit, and some of the plants also, and sell them. We have police, but no detectives; and I endorse Dr. Alexander's experience and assertion that our negroes are a set of liars and thieves from one end of the island to the other. Pigs, goats, and sheep, all become a prey to them, and there is consequently little necessity for labour.

The *Pimento* is one of our useful indigenous plants, but there is scarcely any sale for it, and its price will not pay for pickling it.

Logwood is another staple of little use, and not worth shipping. I have some thousand tons of it, which I am selling at a dollar a ton as it grows.

Our *Bamboo* would be a source of wealth, if it were used and prepared as paper stuff. It would afford suitable and remunerative employment for the 600 or 700 felons in the penitentiary. The Bamboo grows 100 feet in four or five months' time; from my own observations I have found it to grow, at an average, eight inches in twenty-four hours.

The *Cinchonas* are thriving well in moist altitudes of 3000 to 5000 feet. A specimen of *C. rubra*, that I raised, is now 14 feet high, robust and healthy, producing flowers in plenty. Mr. Thomson is now living up in the Rose Mountains, rearing plants and preparing sites for them, under the instructions of Government.

Dr. Hooker communicates with me in a very kind way, requesting a continuance of interchange. He says that he is now making good use of my reports relative to the *Bœhmeria nivea* with the Government. I wish something could be done for this all but abandoned country. I have officially given in my opinion, as favourable to an extensive cultivation of this plant. Last post brought me a letter from the American Consul in Kingston, asking for plants and seeds, etc. The Yankees are sure to succeed in the Southern States, and it appears they are now buying up the fibre in large quantities, and making a very profitable use of it. How long will the English nation be blind to its own interests and those of the Colonies? There is also a waste

of our fibrous products, such as Bananas and Plantains, Bamboos, etc., to the extent of half a million tons per annum. I am tired and disgusted with seeing such an abundance of wealth wilfully wasted. We only require some good, cheap, and efficient machinery to set us a-going.

Golden-veined Blackberry.

I enclose an instance of variegation in the leaves of a Blackberry picked near here. They were marked in every manner of yellow, and appeared in the hedge where they grew to glisten with bars of gold.—*Brinsley Marlay, Finchden, Tenterden, Kent, June* 25. [The contrast of green and gold in the leaves was very beautiful.—*Eds. Gard. Chron.*]

CORRESPONDENCE.

Pleurococcus Beigeli.

I learn from a friend that the August number of the 'Journal of Botany' contains a letter by Dr. Tilbury Fox on *Pleurococcus Beigeli.* I regret not having yet had an opportunity of seeing that number; and being detained in Paris by the International Medical Congress, will you permit me to say that I hope in next number to give you a systematic description of the minute *Alga*, and reply to any statements in Dr. Fox's letter, should they require it.

Paris, Aug. 18, 1867. H. Beigel.

In my Botanical rambles this month I have been so fortunate as to gather some fine specimens of *Utricularia neglecta* (Lehm.) in the Gloucester and Berkeley Canal (where I also find in great plenty *Acorus Calamus*). I have sent specimens of *U. neglecta* to J. B. Syme, Esq., who says it is certainly this plant. He says in Eng. Botany that "the palate is striated with numerous anastomosing bright red streaks;" and this is quite correct, although his new plate in Eng. Botany has them not.

Gloucester, August 27, 1867. G. S. Wintle.

BOTANICAL NEWS.

Botanical Class—Edinburgh University.—Professor Balfour has been good enough to supply us with the following particulars:—During the session

just completed the number of Pupils was 170; Lectures, 60; Practical and Histological Demonstrations, 56; and Saturday excursions, 11. The number of species collected during the excursions was—Phanerogamous plants, 625; Ferns and their allies, 36; Mosses and Hepaticæ, 140; Lichens, Algæ, and Fungi, 90; total, 891; and the number of miles travelled by railway, steamboat, and walking, was 650. The number of students at the excursions varied from 45 to 90; and the total expense to each student of all these trips amounted to £1. 8*s*. 8*d*. In announcing the prizes for next year, Professor Balfour informs us, that in addition to the gold medal for the best herbarium of Phanerogams collected within twenty miles of Edinburgh, and the prize for the best collection of Cryptogams from the same district, his Highness the Maharajah of Jeypore Ram Singh Bahudur, G.C.S.I., has offered a prize of twenty pounds for the best collection of Scottish Phanerogamous plants and Ferns; and another prize of five pounds for the best and approved collection, either of Scottish Mosses and Lichens or of Scottish Sea-weeds. The collections are to become the property of the Maharajah, and to be deposited in the Museum of his Highness at Jeypore.

A memorial tablet, of beautiful design, the work of Mr. R. Palgrave, enclosing a cast in "Wedgwood ware" of Mr. Woolner's medallion of the late Sir William Hooker, is about to be erected in Kew Church, near the grave of the famous botanist. The medallion occupies the centre of a composition of panels that are decorated with Ferns, etc., in low relief, the fronds being arranged so that their lines harmonize with their position on the monument; the panels are divided, and mounted in mouldings of white marble. The portrait is of white, on a ground of smalt blue, the foliage of white on a delicate green; buff is used for certain minor panels which appear round the head, and, like their more important companions, are decorated with Ferns. Apart from the medallion, the charm of this work is in the exquisitely delicate execution of the fronds, which have been modelled with the utmost elegance and sense of natural grace by Mr. Palgrave, whose skill is already known from a monument erected by him in Reigate churchyard. It would be impossible to praise too highly the subtle beauty of outline, the quiet loveliness of the curves, and the wealth of delicate contours which appear in this remarkable specimen of modelling.

Government has decided on the cultivation of Cinchona in Jamaica, the propagation of which is now being carried on favourably. "I now possess," writes Mr. Robert Thomson, "3000 plants, mostly from seed procured through Dr. Hooker. The introduction of the cultivation of the Assam Tea plant is also under the consideration of Government—a few acres. Comparatively extensive tracts of land exist throughout Surrey, one of the three counties into which the island is divided, eminently adapted for the above two cultures."—*Gard. Chron.*

BOTANICAL SOCIETY OF EDINBURGH.—Thursday, 11th July. William Gorrie, Esq., V.P., in the chair.—The following communications were read:—I. Dr. Dickie on *Buxbaumia indusiata* (*vide ante*, p. 262). II. Botanical Intelligence. By Professor Balfour. 1. *Talbotia elegans.* Dr. Balfour placed on the table a

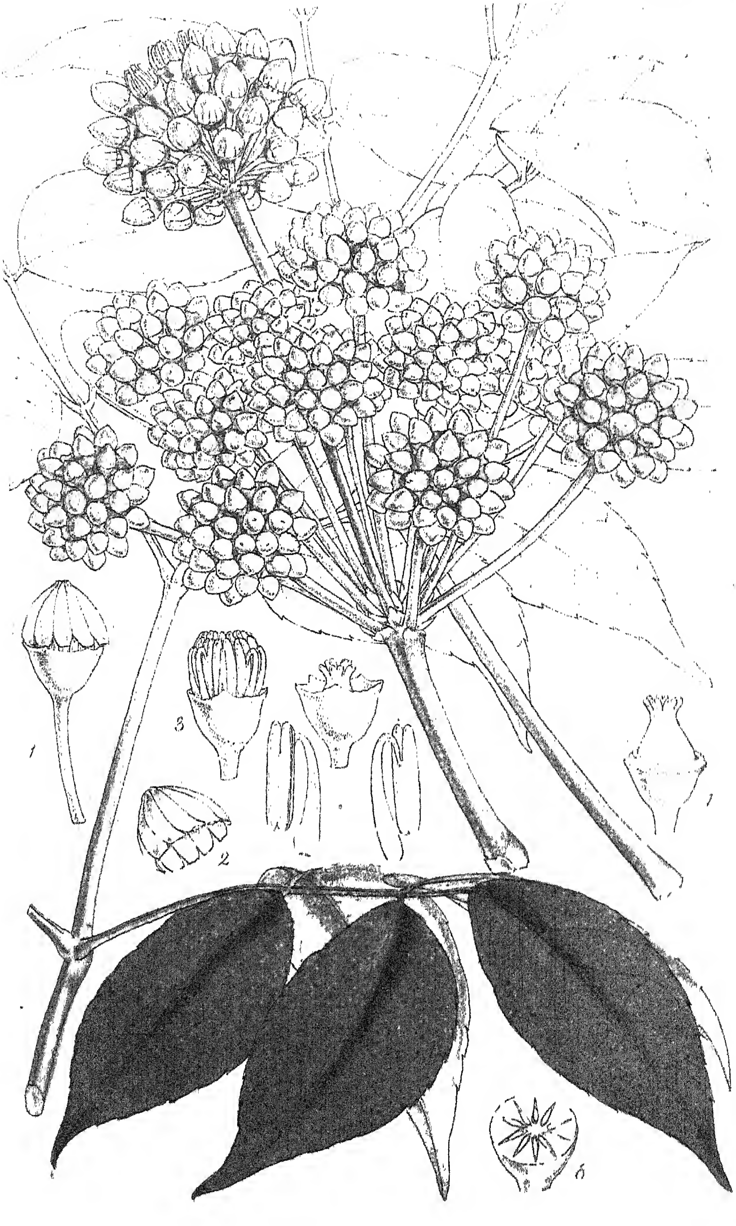
flowering specimen of the plant sent by H. Fox Talbot, Esq., and which was described at last meeting under the name of *Vellozia Talboti*. Dr. Balfour thought that, although the plant was very nearly allied to *Vellozia*, yet it possessed certain characters in which it disagreed with that genus. He proposed, therefore, that it should be made a new genus, and in the meantime he would name it in honour of his friend Mr. Talbot, and designate it *Talbotia elegans*.—2. Gases found in Plants. Messrs. Faivre and Dupré have recently examined the gases found in the mulberry and vine, the parts which contain them, and the changes produced in them by the process of growth and development. They have arrived at the following conclusions:—1. The presence of gases in the interior of the root, of the stem, and of the branches in the mulberry and vine, is a normal and constant fact. 2. The composition of these gases changes with the epochs of vegetation. 3. During the period of inactivity, carbonic acid is in very small proportion, and is scarcely appreciable. Oxygen is present to the same extent as in atmospheric air. During the phase of activity the contrary takes place, and the changes are more marked in proportion as the vegetation is more energetic; with the progress of vegetation, the proportion of oxygen diminishes. 4. In the roots, during the epoch of vegetation, the quantity of oxygen is not so great, while that of carbonic acid is greater than in the branches examined under the same circumstances. 5. In the branches, as in the roots, there is an inverse relation between the oxygen and the carbonic acid; by adding to the normal oxygen that disengaged under the form of carbonic acid, we obtain a number which is scarcely above the proportion of oxygen in the air. 6. In the mulberry and the vine, injections do not penetrate the pith or the bark, whether in the branches or roots. The ligneous layers are alone permeable to mercury. The more the formation of vessels increases, the easier and more complete are the injections. The injections are fuller in the roots than the branches; they are also more in the branches than in the young herbaceous shoots. In the old stems of the mulberry, the central layers cease to be permeable. 7. Microscopic examination proves that the injection specially penetrates the pitted and reticulated vessels, and also the spiral vessels in the young herbaceous shoots. 8. The pitted vessels show distinctly the mercury in the areolæ, as if in so many little pouches formed by thin portions of the wall; the same observations have been made in regard to the reticulated vessels. 9. The contents of the vessels expelled by the mercury is variable. Sometimes gas only is sent out: this is the case in winter and after dry weather. Sometimes the gas is mixed with sap, which is more or less abundant according to the epoch of vegetation and external temperature. These two latter conditions regulate, in a certain degree the contents of the vessels. 10. The contents are so variable that in plants, the root-vessels of which contain gases and sap, the stem-vessels contain only gases, or inversely. 11. The presence in the vessels of animals of oxygen and carbonic acid mixed with the blood, constitutes one of the best established facts in animal physiology; the presence of the same gases mixed with the sap in the vessels of plants, and the modifications which they there undergo, seem to establish an interesting correspondence between these two kingdoms.—3. Nature and Structure of the Pod of

Cruciferæ. Dr. Balfour criticized and condemned the views of Dr. Nevins on this subject, published in a late number of the 'Liverpool Naturalists' Journal.' III. On the Palm-trees of Old Calabar. Extracted from the MS. Journals of the late Mr. William Grant Milne. By Mr. Sadler. The *Ata ukot*, wine palm, or common mimbo, is apparently an undescribed species of *Raphia*. It yields a very pleasant beverage, which is much appreciated by all classes of people who have the fortune, or rather misfortune, to touch the western shores of Africa. It has been cultivated by the natives for ages for its watery fountain. The trees are generally seven years old before they are tapped. At this age they are from 30 to 40 feet in height. The natives ascend the trees and pierce a hole to the centre of the stem immediately below the growing-point; a small pipe is then inserted into the hole and led into a vessel which is fixed to the tree. In this way it is drained from time to time, which causes the tree to die, and it is then cut down to make room for others. The mimbo thrives best in damp situations, and such localities are generally chosen for its cultivation; at the same time, I have seen avenues of mimbo-trees on high sandy places leading to towns. The people employed to tap the mimbo are Ebebo slaves, which are purchased by kings and chiefs at public slave marts. The Calabarians are not a climbing race. The Ebeboes are in practice superior in the art of "speeling." The liquid, when taken from the tree, has somewhat the colour of cream, and has a pleasant sweetish taste. This only lasts a few hours, when it becomes tartish. The natives have certain barks which they bruise and mix with the liquid, which renders it intoxicating. It is sold in the public markets; and in the Ebebo country there are mimbo public-houses, similar to our beer-shops. It is used by the missionaries' wives for making bread, being very subject to fermentation; the bread made with it is excellent. The young leaves of the plant are split up into threads and made into fine bags. 2. The *Iya*, or bamboo palm, is another species of the same genus (*Raphia*). Its petioles are used for house building at Calabar, and all along the coast. These petioles are generally from 20 to 30 feet long. The fruit is used as an article of food, which is not the case with the last-named species. Many of the trees are from 50 to 60 feet high. In the Uwet country the natives do not cultivate the wine-palm, consequently they tap the bamboo; but the wine is strong, and harsh, and unpleasant, and is very intoxicating. The inland kings and chiefs indulge themselves to excess in drinking bamboo wine, and consequently are always in a state of stupidity. The tree is tapped in the same way as the mimbo, at the base of the growing-point. In the Qua country, at the foot of the Qua mountains, they use the wine of the oil-palm (*Elais guineensis*), which is inferior to that of the bamboo, being much harsher and stronger. In this case the trees are tapped about 2 feet from the ground, in the same way as already described. I never saw any of the natives intoxicated by this wretched wine, but I have no doubt that they can add ingredients to it that will make it intoxicating. 3. Another species is the *Afea oku ukot*, or the white rod mimbo. The petioles of this Palm are white, while that of the *Ata ukot* are red. Its wine is equal in quality to that of the *Ata ukot*. The scales of the fruit are, however, much thicker than those of that species, and

of the bamboo. 4. The *Idim ibum* is perhaps the most important Palm at Calabar. *Idim* signifies water, and *ibum* great. It occurs on the banks of the main branch of the Calabar river, but confined to the district of Ikoriofiong. The quantity of wine which this plant produces is astonishing. An ordinary tree will yield a puncheon of a most delicious beverage, which is deservedly a great favourite with the people. In colour it resembles cream, and is sold in large quantities at the mimbo public-houses. When the tree is once tapped, it invariably bleeds itself to death. This is not the case with the common mimbo; it can be tapped from time to time till the fluid is exhausted, and then it dies. Such is also the case with the *Idim ibum*, the *Iya* or bamboo, the *Afea oku ukot*, and the Oil Palm. 5. The last of this class of Palms, belonging to *Raphia*, met with at Calabar, is the *Iya asiakia nditto*, which signifies 'children.' The base of the fruit is surrounded by numerous scales similar to those produced at the base of bulbiferous plants—these are called by the natives children. This Palm is not common. 6. Another nearly allied species is plentiful upon the south coast, which sends up numerous shoots, similar to the Plantain, covering a great space of ground. 7. On the south coast a species of Date is abundant on the sea-shore, but not inland. The fruit is small, and of an oval shape. In taste the pulp is similar to that of the Date of commerce. Its foliage also resembles that of the common Date, and might easily be mistaken for it were it not for the fruit. 8. A Fan Palm is plentiful at Citia Camma, but I have not seen the plant, never having been so far south. Captain Kirkwood has two plants raised from seed collected at Citia Camma, where he states it is abundant. IV. Notice of Two Species of Mosses New to Science. By Dr. Buchanan White. Dr. White gave descriptions of two species of *Hypnum*, which he had collected in 1865, on Ben Lawers, in Perthshire, and which had been ascertained to be as yet undescribed in any work. The one he proposed to call *Hypnum Breadalbanense*, and the other *H. montanum*. Drawings of the plants were exhibited. V. On a Fungoid Disease affecting the Human Hair. By John Bishop, Esq. As the subject of fungoid growths within or upon the human hair is of considerable interest to botany, as well as to medicine, I desire to contribute the following imperfect notice of a case which has recently come under my own observation:—The patient is a young man, at about twenty-six. His general health is very good. In the spring of 1865 he noticed that considerable portions of his beard appeared as if the hairs had been "singed." This was especially noticeable on the right side, along the line from the angle of the lower jaw to an inch within or so of the symphysis. By the middle of summer the beard had resumed its normal appearance. About March, 1866, the same symptoms recurred. The right side was again the worst. The hairs were harsh, stubbly, and crooked. They broke off short, and the broken ends were curiously twisted, curled, and shrivelled, like hairs which have been partially burnt. The skin was hyper-sensitive along the line of the jaw. If a few hairs were pulled (not plucked up), the sensation was very peculiar—half pleasurable and half painful. There was also slight heat and itching, which tempted the patient to rub or scratch the part. He fancied that he could feel pimples on the skin, but none could be observed. The skin

was clean and healthy-looking. There was a bare place on the right side about $1\frac{1}{2} \times \frac{3}{4}$ inch. This was perhaps caused by the rubbing. A lead lotion was applied, and afterwards one of potassic sulphide. The hairs reached their ordinary length, and resumed a healthy appearance in the summer. Towards the end of March, this year, a few of the diseased hairs were again noticed. In May, ℥viii of potassic sulphide lotion (gr. v ad ℥) were applied, but the number of damaged hairs continued to increase until the beginning of July. Since then the progress of the disease appears to have been checked by a wash of potassic bicarb., followed by a lotion of mercuric bichlor. and nitric æther; the skin appears to be perfectly healthy. There is, however, again the hypersensitiveness before-mentioned, and the hairs appear to be fewer than usual on the right side. The beard has to be cut once in four weeks, or the difference in length of right and left side would be quite perceptible. The attack this year is not so severe as on the former occasions. This is shown by the fact, that now the peculiarity is not observed until attention is called to it, whilst formerly the disease was at once remarked. If one of the diseased hairs be examined before it breaks, it will be found to be bent at a sharp angle, and to be evidently ready to break at the angle, and at two or three other points may be noticed small white knots or specks. As many as eight specks have been counted on a hair about $1\frac{1}{4}$ inch in length. Under the microscope the hair presents a remarkably jointed appearance at each of the specks, and if the speck is large the whole substance of the the hair is seen to be split into its component fibres, and a mass of something, which appears to be fungus, is found to protrude from the centre of the hair. This fungus has evidently broken the continuity of the hair, by rupturing it from within outwards, thus giving rise to the fibrous appearance, and also to the bending and fracturing which are so characteristic. If the end of a broken hair be examined, it will be found to have a brush-like appearance, and the fungoid growth will again be visible. The fungus appears to be of a low type, and to consist of an aggregation of cells, with occasionally sporules and *mycelium* branching amongst the broken fibres of the hair. I am at present attempting to investigate the disease further, and if I obtain any results worthy of attention, I shall be most happy to bring them forward on a suitable occasion. The subject appears to demand investigation, as I have heard recently of two or three cases in which the beard has been affected in a similar way to that here related. VI. Miscellaneous Communications. 1. Professor Balfour recorded the following new localities for rare plants in Scotland :—*Alyssum calycinum*, St. Andrew's Links (collected by Mr. Alexander Stewart), near Loch Leven (Mr. Buchan); *Allium Schœnoprasum*, wall at Hiltly, near Linlithgow (Mr. Duncanson); *Lysimachia thyrsiflora*, in the canal near Linlithgow (Professor Liston); *Veronica Beccabunga*, var. *limosa*, near Cullen House, Banff (Mr. William Brown); *Diplotaxis muralis*, Prestonpans (Dr. Aitchison); *Buxbaumia aphylla*, near Kinloch Rannoch (Dr. Buchanan White). 2. Mr. F. C. Henderson presented a collection of dried plants, contained in eight volumes. The collection was prepared by the late Rev. Andrew Kemp, formerly minister at Aberlady, and his brother, and was principally collected about the close of last century.

Tab. II



REVISION OF THE NATURAL ORDER HEDERACEÆ.

By Berthold Seemann, Ph.D., F.L.S.

(*Continued from p.* 239.)

On the Genus Sciadodendron.

(Plate LXX.)

I first met with this tree in 1846, at Panama, where it is known by the name of Jobo de lagarto, and commonly used for making fences,—poles stuck in the ground taking root readily, and growing very fast. On the 22nd of March, 1847, I sent a collection of Panama woods to the Kew Museum, and n. 33 of that collection were specimens of this tree. But though I looked carefully and frequently for flowers, I could never find any. Mr. Sutton Hayes also records amongst his notes that he had known the tree for years, without being so fortunate as to find any flowers on it. My friend Dr. Duchassaing was the first who gathered some imperfect flowering specimens, which passed into the hands of Professor Grisebach, who referred them, in my 'Bonplandia,' to a new genus of *Araliaceæ* (*Sciadodendron*). The late Mr. Sutton Hayes obtained better specimens of the flowers, which he sent to England, and which I found without a name both at the British Museum and at Kew. There being no leaves of the plant in these herbaria, I did not fail, when, in May last, at Panama, to collect specimens of them, so that I am now able to publish a plate of this common, but so little known tree, that Bentham and Hooker, in the recently-published Part of their 'Genera Plantarum,' were obliged to refer it amongst the doubtful genera.

Sciadodendron belongs to the little group of *Araliaceæ* proper (distinguished from the *Hederaceæ* by the imbricate æstivation of the petals), and from *Aralia*, *Stilbocarpa* and allied genera by its 10-merous flowers.

Sciadodendron, Griseb. in Seem. Bonplandia, 1857, p. 7. Char. gen. emend.: Calyx limbo undulato v. subintegro. Petala 10, ovato-linearia, æstivatione imbricata. Stamina 10, antheris incumbentibus. Ovarium inferum, subglobosum, 10- v. per excessum 12-loculare, stylis totidem inferne cohærentibus, superne divergentibus et radiatim expansis abbreviatis. Ovula in loculo solitaria, pendula. Drupa . . .—Arbor excelsa, inermis, glabra, foliis longe petiolatis supradecompositis, foliolis breviter petiolulatis ovatis acuminatis mucronato-serru-

latis; umbellis 15–40-floris compositis, pedicellis pedunculisque bractea scariosa subrotunda basi suffultis. Species unica:—

1. *S. excelsum*, Griseb. l. c. p. 7. (Tab. Nostr. n. 70.) Nomen vernaculum Panamense "Jobo de lagarto," Nicaraguense "Palo de lagarto."—Geogr. distribution, Isthmus of Panama (Sutton Hayes! Duchassaing! Seemann!), Nicaragua, between Leon and Ocotal (Seemann!), and Peru (Gay! n. 486).

Sciadodendron excelsum, the type of the genus, does not seem to be truly indigenous to the Isthmus of Panama; at all events I have never seen it anywhere but near human habitations. The same remark applies to Carthagena. But I have found it truly wild in the forests of New Segovia, where it is one of the most common trees, and attains a height of sixty feet. I have lately seen in the Paris herbarium specimens of it from Peru, where they had been collected by Gay (n. 486).

This tree is 60 feet high, with a corky, greyish bark. The branches are few, straight, and terminated by the foliage. The leaves are without stipules, from 3–5 feet long, compoundly pinnate, and impart to the tree a Palm-like habit, not unlike that of *Caryota*. The petiole is jointed at the base of the ramification of the leaf, and the joints swollen. On the whole, the leaves resemble those of *Heteropanax fragrans*, Seem. The tree flowers without leaves and very seldom, I having seen it but once in flower. The flowers grow from the old wood, and are greenish.

In the Isthmus of Panama the tree is known by the name of Jobo de lagarto (Alligator Jobo), from a certain resemblance of the bark of the tree to the skin of an alligator. In Nicaragua it is vernacularly termed "Palo de lagarto" (Alligator's tree), the name of "Jobo" being unknown there. In the isthmus the natives apply the leaves (macerated) with beneficial effect to ulcers. The ashes of the wood are used in Nicaragua in the manufacture of soap.

Explanation of Plate LXX., representing *Sciadodendron excelsum*, Griseb. The flowers from specimens collected by Sutton Hayes, at Panama, and kindly lent by Dr. Hooker; the leaves from specimens collected by me in the same place. Fig. 1. Flower. 2. Petals. 3. Flower with petals removed. 4. The same, with stamens removed. 5 and 6. Stamens. 7. Pistil. 8. Cross section of ovary:—all magnified.

ON THE PLANTS CULTIVATED OR NATURALIZED IN THE VALLEY OF CARACAS, AND THEIR VERNACULAR NAMES.

By A. Ernst, Esq.

(*Concluded from p.* 275.)

Psidium Guajava, Raddi. 'Guayabo.'—Our common form is *P. pomiferum*. It is sometimes a middle-sized tree, sometimes a low shrub. *P. pyriferum* never attains the size of a tree. I know from trustworthy sources and my own experience, that both forms are hereditary. As they agree in all other points except the shape of the fruit, they ought to be considered as two distinct races. The name 'Guayabo' is known in most countries where the plant grows. There is nevertheless a quite different Quichua name, 'Sahuinta' (Markham), or as Garcilaso de la Vega writes, 'Savintu.'

Lagenaria vulgaris, Ser. 'Calabaza, ó Camasa,' according to Diez, probably from the Arab. *querbah* or *querbat*, plur. *querâbat* (*i.e.* water skin).—Common.

Cucurbita Pepo, Durh.—The derivation of the vernacular name, 'Aullama' or 'Auyama,' is obscure. Could it have any relation with the 'Tayuya' (*Trianosperma ficifolia*, Mart.), of the Rio Grande and Minas Geraes? The oldest authority for this name is Nicolaus Federmann (Indianische Historie, 1557, p. 20 of the edition published by the Stuttgart Literary Society). He writes 'Oyama;' Caulin 'Hullama.' Federmann was for the first time in Venezuela in 1529 and 1530.

Cucumis Melo, L. 'Melon.'—Seldom cultivated.

Cucumis Citrullus, Ser. 'Patilla.'—This name and the French 'pastèque' seem to belong to the same common Hebrew root, *ab-batichim* (De Cand. Géogr. Bot. p. 909). The Iberian 'Zandia' (the *i* is accentuated), in Catalonia 'Cindria' (accent on the second syllable) or 'Cindriera,' and the Sardinian 'Sindria,' mentioned by Alph. De Candolle (l. c.), are derived from the Lat. *cincturare*,—the Catal. 'Cindria' meaning originally a vault (see Diez, Etym. Wörterb. i. p. 122, sub voce *centinare*). We have therefore here the same idea as in *Cucumis* and *Cucurbita*, which are derived from a root that means *curvus* or *cavus* (Alph. De Cand. l. c. p. 900).

Cucumis sativus, L.—Seldom cultivated. The Spanish name 'Cohombro' is unknown in Caracas; plant and fruit are called 'Pepino,' a diminutive of *Pepo*.

Chrysophyllum Cainito. 'Caimito.'—Rare, as it requires a hotter climate.

Lucuma pauciflora, Alph. De Cand. (not *L. Rivicoa*, Gærtn., as I erroneously stated in the third volume of this Journal, p. 313), 'Garci Gonzalez.'—The description in the 'Prodromus' (viii. p. 168, n. 15) agrees very well with our plant; but the leaves are generally larger. The seed of *L. Rivicoa*, Gærtn., as described in the 'Prodromus' (viii. p. 169, n. 21) is either quite as large as that of *L. pauciflora*, or that description is taken from seeds belonging to the latter species. The fruit of the *Garci Gonzalez* is from 1″ to 1½″ in diameter, compressed spherical, and crowned with the persistent pistil. When ripe it contains a yellow mealy pulp, resembling very much the boiled yolk of an egg, and having a sweet taste, like the pulp of *Hymenæa Courbaril.* Bats are exceedingly fond of it.

Sapota Achras, Mill. 'Nispero' (from 'Mespilus').—Common.

Solanum esculentum, Dun. 'Berenjena,' from the Asiatic roots mentioned by Alph. De Candolle (Geogr. Bot. p. 915).—Common.

Lycopersicum esculentum, Mill. 'Tomate,' from the Aztec 'Tomatl.'—Common.

Cyphomandra betacea, Sendtn. 'Tomate Francés.'—Cultivated as an ornamental plant; the fruit is eatable.

Persea gratissima, Gærtn. 'Aguacate,' from the Aztec 'Ahuacatl.'—Common.

Papaya vulgaris, DC. 'Lechoso,' *i. e.* milky.—The original name 'Papaya,' having an obscene meaning in Caracas, is never used. Common.

Ficus Carica, L. 'Higuera' (the plant); 'higo' (the fruit).—Not very common.

Artocarpus incisa, L. 'Fruta de Pan.'—Rare in the valley of Caracas, but frequently cultivated in the Tierra Caliente.

Phœnix dactylifera, L. 'Palma de Dátiles.'—Rare.

Musa.—The species generally cultivated in the valley of Caracas is *Musa sapientum*, L., but *M. paradisiaca*, L., would grow as well. It is not cultivated, but not as Humboldt (Ess. Pol. Nouv. Esp. 1811, tom. iii. p. 26) supposes, on account of unfavourable climatical causes.* It is true that it thrives more luxuriantly in the Tierra

* Or was Humboldt right in *his* time, as there certainly has been a most remarkable change of climate in the valley of Caracas?

Caliente, but its fruit ripens perfectly well at an elevation of nearly 1000 metres, where there is a mean temperature of from 21° to 25° C. I have seen it myself laden with full ripe fruits, 12–15″ long, in Los Mariches, east of Caracas, at 1578 metres elevation, with a mean temperature of 19° C. (66·2° F.), in calmy places exposed to the south. I found even some sickly specimens at an elevation of 1992 metres. The plants of higher localities do not yield so much fruit, and die sooner than those of the hot lowland.

I add a synopsis of the principal varieties, with small fruits, cultivated in our neighbourhood, and called 'Cambur.'

- I. Stem dwarfish, not over 2 yards high. *Cambur pigmeo.*
- II. Stem growing much higher.
  - A. Fruit obtusely triangular. *Cambur criollo.*
  - B. Fruit obtusely 5-angular or nearly cylindrical.
    - a. Fruit comparatively large, 6–8″ l. *Cambur harton.*
    - b. Fruit smaller, seldom more than 5″ l.
      - α. Ripe fruit (and generally the stems and leaf-stalks) reddish.
        - aa. Peel of the fruit pink, flesh white. *Cambur morado.*
        - bb. Peel and flesh rosy. *Cambur terciopelo.*
      - β. Ripe fruit yellow.
        - aa. 3–5″ l., 1″–1½″ thick. *Cambur manzana.*
        - bb. 2–3″ l., ¾″ thick. *Cambur titiaro.*

'Cambur topacho' is the result of crossing between 'Plátano' (*M. paradisiaca*) and 'Cambur morado.'

With reference to the alleged American origin of one or several species of *Musa* I have something to add. There is first the passage in Garcilaso de la Vega, 'Comentarios Reales' (Madrid, 1723, p. 282, cap. xiv.), which has been overvalued as a proof of it. This begins in the original:—"Volviendo á las frutas, diremos de algunas mas notables que se crian en los Antis del Perú, que son tierras mas calientes y mas húmedas que no las provincias del Perú. El primer lugar se debe dar al árbol y á su fruto, que los Españoles llaman Plátano." (But to return to the fruits, we shall mention some of the more remarkable ones, that grow in the Andes of Peru, which are hotter and more humid parts than the other provinces of Peru. The first place must be given to the tree and its fruits, called 'Plátano' by the Spaniards.) He says therefore simply that the *Musa is* cultivated in Peru, but there is not the slightest indication that the author is speaking of any other time than his own. He was born in 1530, only two years

before the arrival of Pizarro. In the chapters ix. to xv. of his work, Garcilaso mentions several other vegetable products of his native country, in all cases adding carefully the Quichua names. But he gives *none* for so remarkable and useful a plant as the *Musa*; nor do I find one in Markham's 'Contributions.' If there exists no true Quichua name, it would be a sufficient proof that the *Musa* was introduced to Peru.

There is another apposite argument which is of much greater importance than the doubtful assertion of Garcilaso. Oviedo (Sumario, ed. Rivad. p. 506) says decidedly, "Estos plátanos los hay en todo tiempo del año; pero no son por su orígen naturales en aquellas partes, porque de España,* fuéron llevados los primeros." (These plantains grow throughout the whole year, but they are not originally indigenous in those parts, the first having been brought from Spain.) I have already mentioned that Oviedo's work was published in 1526, four years before the Inca Garcilaso was born.

I cannot even consider as indigenous the names 'Paruru' (in Tamanac) and 'Arata' (in Maypure), mentioned by Humboldt as proofs of his hypothesis. The Tamanac language changes very much the words taken from the Spanish. So 'soldado' becomes in Tamanac 'choraro' (Humb. Travels, Bohn's edit. i. p. 322). The word 'plátano' may, in similar manner, have changed into 'paruru'; the Guarauni-form 'burutano' offers a connecting link. The Maypure form 'Arata' is easily understood when compared with the Pareni-name 'paratana,' which means the same plant.

Ananassa sativa, Lindl. 'Piña.'—In the valley of Caracas seldom cultivated, but frequently in the hot savanas to the east and south.

ON THE PLANTS COMMON TO THE SOUTHERN UNITED STATES AND VENEZUELA.

By A. Ernst, Esq., of Caracas.

The plants of the Southern United States are taken from Dr. Chapman's 'Flora' (New York, 1860), those of Venezuela chiefly from my

* The Spanish writers include the Canary Islands in the denomination España.

own observations. The numerator of the fraction after the name of the family gives the total number of species mentioned in Dr. Chapman's work; the denominator indicates how many of these same species are found in Venezuela.

Papaveraceæ. $\frac{2}{1}$ (50 p. cent.).
1. Argemone Mexicana, *L.*

Cruciferæ. $\frac{40}{5}$ (12·5 p. cent.).
2. Nasturtium palustre, *DC.*
3. Nasturtium officinale, *R. Br.*
4. Senebiera pinnatifida, *DC.*
5. Lepidium Virginicum, *L.*
6. Cakile maritima, *Ross.*, *var.* æqualis, *L'Hér.*

Capparideæ. $\frac{5}{4}$ (80 p. cent.).
7. Cleome pungens, *Willd.*
8. Gynandropsis pentaphylla, *DC.*
9. Capparis Jamaicensis, *Jacq.*
10. Capparis cynophallophora, *L.*

Clusiaceæ. $\frac{2}{2}$ (100 p. cent.).
11. Clusia flava, *L.*
12. Canella alba, *P. Br.*

Portulaceæ. $\frac{7}{3}$ (43 p. cent.).
13. Portulaca oleracea, *L.*
14. Portulaca pilosa, *L.*
15. Sesuvium Portulacastrum, *L.*

Caryophylleæ. $\frac{41}{4}$ (10 p. cent.).
16. Polycarpon tetraphyllum, *L.*
17. Mollugo verticillata, *L.*
18. Arenaria diffusa, *Ell.*
19. Cerastium viscosum, *L.*

Malvaceæ. $\frac{29}{8}$ (27·6 p. cent.).
20. Malvastrum tricuspidatum, *Gray.*
21. Sida spinosa, *L.*
22. Sida supina, *L.*
23. Sida stipulata, *Cav.* (S. carpinifolia, *L.*, *conf. Griseb. Flora West Ind.* 73.)
24. Sida rhombifolia, *L.*
25. Sida ciliaris, Cav.
26. Abutilon crispum, *Gray.*
27. Hibiscus tiliaceus, *L.*

Buettneriaceæ. $\frac{2}{1}$ (50 p. cent.).
28. Waltheria Americana, *L.*

Tiliaceæ. $\frac{4}{1}$ (25 p. cent.).
29. Corchorus siliquosus, *L.*

Olacineæ. $\frac{1}{1}$ (100 p. cent.).
30. Ximenia Americana, *L.*

Cedreleæ. $\frac{1}{1}$ (100 p. cent.).
31. Swietenia Mahagoni, *L.*

Zygophylleæ. $\frac{3}{2}$ (66·6 p. cent.).
32. Tribulus cistoides, *L.*
33. Guajacum sanctum, *L.*

Rutaceæ. $\frac{6}{1}$ (16·6 p. cent.).
34. Xanthoxylum Pterota, *H. B. K.*

Burseraceæ. $\frac{2}{2}$ (100 p. cent.).
35. Bursera gummifera, *Jacq.*
36. Amyris Floridana, *Nutt.* (A. sylvatica, *Jacq. Griseb.* 174.)

Vitaceæ. $\frac{10}{1}$ (10 p. cent.).
37. Vitis Caribæa, *De Cand.*

Rhamneæ. $\frac{10}{2}$ (20 p. cent.).
38. Scutia ferrea, *Brongn.* (Condalia ferrea, *Gr. Griseb.* 100.)
39. Gouania Domingensis, *L.*

Celastrineæ. $\frac{8}{1}$ (12·5 p. cent.).
40. Schæfferia frutescens, *Jacq.*

Sapindaceæ. $\frac{9}{2}$ (22 p. cent.).
41. Dodonæa viscosa, *L.*
42. Cardiospermum Halicacabum, *L.*

Leguminosæ. $\frac{154}{24}$ (15·6 p. cent.)
43. Trifolium repens, *L.*
44. Indigofera tinctoria, *L.*

45. Indigofera Anil, *L.*
46. Stylosanthes elatior, *Sw.*
47. Desmodium molle, *De Cand.*
48. Desmodium rotundifolium, *De Cand.*
49. Rhynchosia minima, *De Cand.*
50. Rhynchosia Caribæa, *De Cand.* (*Griseb.* 190.)
51. Vigna luteola, *Benth.*
52. Centrosema Virginiana, *Benth.*
53. Galactia pilosa, *Nutt.* (*Griseb.* 194.)
54. Canavalia obtusifolia, *De Cand.*
55. Sophora tomentosa, *L.*
56. Cassia occidentalis, *L.*
57. Cassia obtusifolia, *L.*
58. Cassia angustisiliqua, *Lam.*
59. Cassia biflora, *L.*
60. Cassia Chamæcrista, *L.*
61. Cassia nicticans, *L.*
62. Schrankia brachycarpa, *Benth.*
63. Schrankia uncinata, *Willd.*
64. Pithecolobium Unguis-cati, *Bth.*
65. Desmanthus depressus, *H. B. K.*
66. Desmanthus virgatus, *Willd.*

Rosaceæ. $\frac{51}{1}$ (2 p. cent.).

67. Chrysobalanus Icaco, *L.*

Lythrarieæ. $\frac{8}{1}$ (12·5 p. cent.).

68. Cuphea viscosissima, *Jacq.*

Rhizophoreæ. $\frac{1}{1}$ (100 p. cent.).

69. Rhizophora Mangle, *L.*

Combretaceæ. $\frac{4}{3}$ (75 p. cent.).

70. Laguncularia racemosa, *Gærtn.*
71. Conocarpus erectus, *Jacq.*
72. Terminalia Catappa, *L.*

Onagrarieæ. $\frac{41}{1}$ (2·4 p. cent.).

73. Jussiæa decurrens, *De Cand.*

Cacteæ. $\frac{6}{3}$ (50 p. cent.).

74. Cereus triangularis, *Haw.*
75. Opuntia Ficus-Indica, *Haw.*
76. Opuntia vulgaris, *Mill.*

Turneraceæ. $\frac{3}{1}$ (33 p. cent.).

77. Piriqueta tomentosa, *H. B. K.* (Synopsis, iii. p. 409.)

Passifloreæ. $\frac{5}{1}$ (20 p. cent.).

78. Passiflora suberosa, *L.*

Cucurbitaceæ. $\frac{3}{2}$ (66 p. cent.).

79. Melothria pendula, *L.*
80. Sicyos angulatus, *L.*

Umbelliferæ. $\frac{41}{1}$ (2·4 p. cent.).

81. Hydrocotyle umbellata, *L.*

Caprifoliaceæ. $\frac{20}{1}$ (5 p. cent.).

82. Sambucus Canadensis, *L.*

Rubiaceæ. $\frac{46}{9}$ (19·6 p. cent.).

83. Spermacoce tenuior, *L.*
84. Ernodea litoralis, *Sw.*
85. Chiococca racemosa, *Jacq.*
86. Guettarda ambigua, *De Cand.* (*Griseb.* 332.)
87. Hamelia patens, *Jacq.*
88. Randia aculeata, *L.*
89. Exostemma Caribæum, *R. and S.*
90. Mitreola petiolata, *Torr. and Gray.* (*Griseb.* 331.)
91. Polypremum procumbens, *L.*

Valerianeæ. $\frac{4}{1}$ (25 p. cent.).

92. Valeriana scandens, *L.*

Compositæ. $\frac{369}{18}$ (4·9 p. cent.).

93. Ageratum conyzoides, *L.*
94. Conyza ambigua, *De Cand.*
95. Pluchea purpurascens, *De Cand.*
96. Parthenium Hysterophorus, *L.*
97. Ambrosia artemisiæfolia, *L.*
98. Xanthium strumarium, *L.*
99. Eclipta erecta, *L.*
100. Eclipta longifolia, *Schrad.*
101. Borrichia arborescens, *De Cand.*
102. Melanthera deltoidea, *Rich.*

103. Zinnia multiflora, *L.*
104. Cosmos caudatus, *Kunth.*
105. Bidens leucanthus, *Willd.*
106. Bidens bipinnatus, *De Cand.*
107. Gnaphalium polycephalum, *Michx.*
108. Erechthites hieracifolia, *Raf.*
109. Sonchus oleraceus, *L.*
110. Sonchus asper, *Vill.*

Goodenovieæ. $\frac{1}{1}$ (100 p. cent.).

111. Scævola Plumieri, *L.*

Theophrastaceæ. $\frac{1}{1}$ (100 p. cent.).

112. Jacquinia armillaris, Jacq.

Myrsineæ. $\frac{2}{1}$ (50 p. cent.).

113. Myrsina Floridana, *De Cand.* (*Griseb.* 392).

Plantagineæ. $\frac{7}{2}$ (28·5 p. cent.).

114. Plantago major, *L.*
115. Plantago Virginica, *L.*

Plumbagineæ. $\frac{2}{1}$ (50 p. cent.).

116. Plumbago scandens, *L.*

Lentibularieæ. $\frac{13}{1}$ (7·7 p. cent.).

117. Utricularia subulata, *L.*

Bignoniaceæ. $\frac{5}{1}$ (20 p. cent.).

118. Tecoma stans, *Juss.*

Scrophularineæ. $\frac{68}{5}$ (7·35 p. cent.).

119. Herpestis Monnieria, *Kunth.*
120. Capraria biflora, *L.*
121. Scoparia dulcis, *L.*
122. Buchnera elongata, *Sw.*
123. Castilleja coccinea, *Spreng.*

Acanthaceæ. $\frac{14}{1}$ (7·1 p. cent.).

124. Dicliptera assurgens, *Juss.*

Verbenaceæ. $\frac{18}{8}$ (44·4 p. cent.).

125. Priva echinata, *Juss.*
126. Verbena urticifolia, *L.*
127. Stachytarpha Jamaicensis, *Vahl.*
128. Lippia nodiflora, *Michx.*
129. Lantana involucrata, *L.*
130. Lantana Camara, *L.*
131. Duranta Plumierii, *Jacq.*
132. Avicennia tomentosa, *Jacq.*

Labiatæ. $\frac{75}{5}$ (6·6 p. cent.).

133. Mentha sp.
134. Micromeria Brownei, *Benth.*
135. Salvia serotina, *L.*
136. Leonotis nepetæfolia, *R. Br.*
137. Leonurus Sibiricus, *L.*

Borragineæ. $\frac{23}{5}$ (21·7 p. cent.).

138. Ehretia Bourreria, *L.*
139. Tournefortia volubilis, *L.*
140. Heliotropium Curassavicum, *L.*
141. Heliophytum Indicum, *De Cand.*
142. Heliophytum parviflorum, *De Cand.*

Convolvulaceæ. $\frac{32}{16}$ (50 p. cent.).

143. Quamoclit coccinea, *Mœnch.*
144. Quamoclit vulgaris, *Chois.*
145. Pharbitis hispida, *Chois.* (*Griseb.* 373).
146. Pharbitis Nil, *Chois.*
147. Ipomœa tamnifolia, *L.*
148. Ipomœa Pes-capræ, Sweet.
149. Ipomœa triloba, *L.*
150. Ipomœa pandurata, *Mey*
151. Ipomœa Bona-nox, *L.*
152. Ipomœa fastigiata, *Sweet.*
153. Ipomœa sinuata, *Ort.* (I. dis-serta, *Pursh.*)
154. Jacquemontia violacea, *Chois.*
155. Evolvulus sericeus, *Sw.*
156. Evolvulus glabriusculus, *Chois.* (*Griseb.* 475.)
157. Dichondra repens, *Forst.*
158. Cuscuta neuropetala, *Eng.* (*Griseb.* 476.)

Solaneæ. $\frac{16}{8}$ (50 p. cent.).

159. Solanum nigrum, *L.*
160. Solanum Radula, *Vahl.*
161. Solanum verbascifolium, *L.*
162. Solanum aculeatissimum, *Jacq.*

163. Solanum mammosum, *L.*
164. Capsicum frutescens, *L.*
165. Physalis angulata, *L.*
166. Physalis pubescens, *L.*
167. Datura Stramonium, *var.* Tatula, *L.*

Apocyneæ. $\frac{9}{1}$ (11 p. cent.).

168. Vinca rosea, *L.*

Asclepiadeæ. $\frac{33}{3}$ (9·1 p. cent.).

169. Asclepias Curassavica, *L.*
170. Metastelma Schlechtendalii, *Decs.*
171. Metastelma parviflorum, *R. Br.*

Nyctagineæ. $\frac{7}{4}$ (55·5 p. cent.).

172. Boerhaavia erecta, *L.*
173. Boerhaavia hirsuta, *Willd.*
174. Pisonia aculeata, *L.*
175. Pisonia obtusata, *Sw.*

Phytolacceæ. $\frac{3}{3}$ (100 p. cent.).

176. Petiveria alliacea, *L.*
177. Rivina humilis, *L.*
178. Phytolacca decandra, *L.*

Chenopodieæ. $\frac{12}{3}$ (25 p. cent.).

179. Chenopodium murale, *L.*
180. Chenopodium anthelminticum, *L.*
181. Salicornia ambigua, *Michx.*

Amarantaceæ. $\frac{19}{11}$ (57·9 p. cent.).

182. Celosia paniculata, *L.*
183. Amarantus spinosus, *L.*
184. Amblogyne polygonoides, *Raf.*
185. Scleropus crassipes, *Moq.* (*Griseb.* 68.)
186. Iresine vermicularis, *Moq.* (*Griseb.* 65 ?).
187. Iresine diffusa, *H. B. K.*
188. Alternanthera achyrantha, *R. Br.*
189. Tetranthera polygonoides, *Moq.*
190. Tetranthera maritima, *Moq.*
191. Tetranthera Brasiliana, *Moq.*
192. Frœhlichia Floridana, *Moq.* (*Griseb.* 63.)

Polygoneæ. $\frac{39}{2}$ (5·1 p. cent.).

193. Polygonum acre, *Kth.*
194. Coccoloba uvifera, *Jacq.*

Laurineæ. $\frac{7}{1}$ (14 p. cent.).

195. Cassyta filiformis, *Jacq.*

Ceratophylleæ. $\frac{3}{1}$ (33 p. cent.).

196. Ceratophyllum demersum, *L.*

Latideæ. $\frac{1}{1}$ (100 p. cent.).

197. Batis maritima, *L.*

Euphorbiaceæ. $\frac{49}{9}$ (18·4 p. cent.).

198. Euphorbia cyathophora, *Jacq.*
199. Euphorbia hypericifolia, *L.*
200. Euphorbia pilulifera, *L.*
201. Euphorbia maculata, *L.*
202. Hippomane Mancinella, *L.*
203. Croton balsamiferus, *L.*
204. Croton glandulosus, *L.*
205. Ricinus communis, *L.*
206. Phyllanthus Niruri, *L.*

Urticeæ. $\frac{11}{1}$ (9 p. cent.).

207. Bœhmeria cylindrica, *L.*

Araceæ. $\frac{9}{1}$ (11 p. cent.).

208. Pistia occidentalis, *Kl.*

Lemnaceæ. $\frac{2}{1}$ (50 p. cent.).

209. Lemna minor, *L.*

Myadeæ. $\frac{10}{3}$ (33 p. cent.).

210. Potamogeton heterophyllus, *Schreb.*
211. Najas flexilis, *Rostk.*
212. Ruppia maritima, *L.* (*Kunth, Syn.* i. 135.)

Hydrocharideæ. $\frac{3}{1}$ (33 p. cent.).

213. Limnobium Spongia, *Rich.*

Burmanniaceæ. $\frac{3}{1}$ (33 p. cent.).

214. Burmannia capitata, *Mart.*

Orchideæ. $\frac{52}{2}$ (3·8 p. cent.).

215. Goodyera pubescens, *Roth.*

216. Ponthievia glandulosa, *R. Br.*

Amaryllideæ. $\frac{1}{7}^{0}$ (10 p. cent.)

217. Hypoxis erecta, *L.*

Bromeliaceæ. $\frac{8}{4}$ (50 p. cent.).

218. Tillandsia utriculata, *Leront.*
219. Tillandsia bulbosa, *Hook.*
220. Tillandsia recurvata, *L.*
221. Tillandsia usneoides, *L.*

Cyperaceæ. $\frac{2}{.}\frac{1}{1}\frac{6}{5}$ (7 p. cent.).

222. Cyperus ligularis, *L.*
223. Cyperus rotundus, *L.*
224. Cyperus articulatus, *L.*
225. Cyperus Haspan, *L.*
226. Cyperus confertus, *Sw.*
227. Cyperus compressus, *L.*
228. Cyperus filiformis, *Sw.*
229. Kyllingia monocephala, *L.*
230. Hemicarpha subsquarrosa, *Nees.*
231. Eleocharis equisetoides, *Torr.*
232. Eleocharis capitata, *R. Br.*
233. Fimbristylis spadicea, *Vahl.*
234. Fimbristylis laxa, *Vahl.*
235. Isolepis capillaris, *R. and Sch.*
236. Abildgaardia monostachya, *V.*

Gramineæ. $\frac{1}{3}\frac{9}{1}\frac{3}{}$ (16·1 p. cent.).

237. Sporobolus Virginicus, *Kunth.*
238. Sporobolus Indicus, *R. Br.*
239. Vilfa aspera, *Beauv.*
240. Aristida stricta, *Michx.*
241. Eustachys petræa, *Desv.*
242. Cynodon dactylon, *Pers.*
243. Dactyloctenium Ægyptiacum, *Willd.*
244. Eleusine Indica, *Gærtn.*
245. Leptochloa mucronata, *Roth.*
246. Leptochloa Dominguensis, *Lk.*
247. Eragrostis reptans, *Nees.*
248. Eragrostis ciliaris, *Link.*
249. Eragrostis conferta, *Trin.*
250. Paspalum Digitaria, *Poir.*
251. Paspalum vaginatum, *Sw.*
252. Paspalum distichum, *L.*
253. Paspalum undulatum, *Poir.* (P. plicatulum, *Michx.*)
254. Paspalum ciliatifolium, *Michx.*
255. Panicum tenuiculmum, *Mey.*
256. Panicum gibbum, *Ell.* (Hymenathne striata, *Gr.*).
257. Panicum fasciculatum, *Sw.*
258. Panicum scoparium, *Rudg.*
259. Panicum divaricatum, *L.*
260. Panicum Crus-galli, *L.*
261. Orthopogon hirtellus, *R. Br.*
262. Setaria glauca, *Beauv.*
263. Cenchrus echinatus, *L.*
264. Cenchrus tribuloides, *L.*
265. Manisuris granularis, *Sw.*
266. Stenotaphrium Americanum, *Schrank.*
267. Andropogon Virginicus, *L.*

Filices. $\frac{5}{1}\frac{6}{2}$ (21·4 p. cent.).

268. Polypodium incanum, *Sw.*
269. Polypodium Phyllitidis, *L.*
270. Polypodium aureum, *E.*
271. Vittaria lineata, *Sw.*
272. Pteris longifolia, *L.*
273. Pteris caudata, *L.*
274. Asplenium Trichomanes, *L.*
275. Asplenium myriophyllum, *Spreng.*
276. Aspidium patens, *Sw.*
277. Aspidium exaltatum, *Sw.* (Nephrolepis exaltata, *Schott.*)
278. Trichomanes radicans, *Sw.*
279. Anemia adiantifolia, *Sw.*

Lycopodiaceæ. $\frac{1}{3}\frac{1}{}$ (36 p. cent.).

280. Lycopodium inundatum, *L.*
281. Lycopodium clavatum, *L.*
282. Lycopodium Carolinianum, *L.*
283. Lycopodium complanatum, *L.*

The following Table shows how the foregoing plants are divided amongst the great divisions of the vegetable kingdom :—

Divisions.	Number of Species in Chapman's 'Flora.'	Of these in Venezuela.	Per Cent.
Polypetalous Exogenous Plants . .	768	81	10·55
Monopetalous Exogenous Plants . .	935	90	9·63
Apetalous Exogenous Plants . . .	236	36	15·25
Gymnospermous Exogenous Plants .	20	0	0·
Endogenous Plants	655	60	9·16
Cryptogamous Plants	70	16	22·85
Total	2684	283	10·54

Although the number of plants common to both Floras is considerable, the comparison does not give any peculiar result. Most of the species are plants which have a wide geographical range in America, many of them even in the Old World; a great number are common on all the coasts of the warmer parts of America, and some are only naturalized in both countries.

WEEDS AND THEIR CHARACTERISTICS.

By Henry Trimen, M.B. Lond., F.L.S.

In a paper lately published in this Journal (Vol. V. p. 195), Dr. Seemann sums up the characteristics of a weed in these words:—"A weed . . . signifies a naturalized herb which has a soft and membranaceous look, grows fast, propagates its kind with great rapidity, and spreads, to the prejudice of endemic or cultivated plants, in places in some way or other disturbed by the agency of man."

The extensive acquaintance with the plants of various lands possessed by the author of the paper referred to, and the consequent large number of facts bearing on the subject at his disposal, renders this view one of considerable interest and importance.

The general notion, however, entertained of a weed, at all events by non-botanical persons, is a wider one than this, and has for its leading character a qualification other than that of naturalization, on which Dr. Seemann strongly insists. This popular signification may be pretty accurately expressed as follows:—A weed is any plant, irrespec-

tive of origin or appearance, occurring in cultivated ground, in addition to, and, therefore, more or less interfering with and injurious to the crop intended to be grown. This is the idea of a weed in the mind of horticulturists and farmers, and as it is sufficiently definite to be scientifically employed, there does not seem to be any special benefit arising from a restricted botanical use of it, such as that advocated by Dr. Seemann.

The leading characteristic of a weed, in this extended sense, is that of being *out of place*, and it is this point that is generally referred to in vague dictionary-definitions of the word.

Though it is the fact that plants are weeds only on ground employed by man for the artificial growth of definite species, yet it does not follow that all weeds must be necessarily exotic species. To take this country, with which I am chiefly familiar, and which is, in all respects, an excellent field for the study of weeds,—although there must always exist widely-different views as to the nativity or otherwise of a large number, yet with regard to some I am not aware that any British botanist has expressed his disbelief in their truly indigenous growth. *Ononis arvensis*, *Tussilago Farfara*, and *Euphrasia Odontites*, are examples. They are certainly weeds, and very troublesome ones, and also, we must believe, in the absence of any kind of evidence to the contrary, natives of this country. *Silene inflata*, *Stellaria media*, and *Veronica hederifolia*, seem to stand in the same category. There is no difficulty in supposing that such species have become weeds since the origin of cultivation, and as a result of it; that, in fact, the conditions set up by agriculture and gardening have furnished numerous localities highly favourable to their growth. What I mean to affirm is, that a plant is a weed only in virtue of its situation; it may be an ornamental or even a useful plant *in its place*, but out of that place it becomes a weed. A Sunflower in a field of turnips is as much a weed as *Brassica Napus* in a flower-garden, but reverse their situations and the term is inapplicable to either. So when waste land, such as a heath, is enclosed and brought under cultivation, the species composing its original flora become weeds in the new fields.

With regard to the term "weedy." It is no doubt true, that many of the common weeds of cultivation have characters such as those indicated by Dr. Seemann, as implied in this term, but there are many others (as the first triplet of plants mentioned above) which are just

the reverse of "soft and membranaceous." The adjective "weedy" seems to me to have a somewhat different meaning. From the situation of many of these plants in rich manured soil, and amongst other and taller plants, they acquire a luxuriant and rapid growth and a straggling habit; and, I think, it is these characters especially that are implied in the term, according to the old proverb, "Ill weeds grow apace."*

In thus advocating the old and fairly well understood use of the word, I would record my sense of the value of Dr. Seemann's observations as applied to naturalized plants, which, like any others, may or may not be weeds.

LYSIDICE,

Genus novum Lathyraceum, ex Cæsalpiniearum subordine,

Proponit Henr. F. Hance, Ph.D., etc.

Calyx basi bibracteolatus, coloratus, infundibularis, tubo carnosulo; limbi 4-partiti laciniis symptyxi † imbricata obtusiusculis, postica paululum majore, sub anthesi reflexis. Corollæ petala tria, calyce paulo breviora ejusque fauci inserta, uno ejusdem laciniæ posticæ opposito, duobus inter eam et laterales sitis, omnibus æqualibus, lamina obovata obtusa longe unguiculata. Stamina 6, annulo calycis faucem vestiente inserta, filamentis basi in annulum brevem cóncretis; duobus minutis inter petala lateralia ac posticum sitis, eorumque unguibus triplo brevioribus, antheras abortivas gerentibus, in alabastro rectis; duobus petalis duplo longioribus, sepalis lateralibus oppositis, fertilibus, ptyxi† inclinativo-plicata, filamentis deorsum dilatatis, antheris magnis ovoideis longitudinaliter dehiscentibus; duobus sterili-

* I know nothing of philology, but suppose that there is something to be said for the view which connects "weed" and the Anglo-Saxon "weód." The latter word appears to be equivalent to the Latin "vestis," "vestimentum," and to mean clothing for man, as well as the green *covering* of the earth. So now we use the term 'weeds' for garments, in the expression, "widow's weeds." In Matt. vi. 30, χόρτος τοῦ ἀγροῦ, "grass of the field," is "æceres weód" in the Anglo-Saxon version; and Spenser uses our word "weeds" to express grass and brushwood of any and various kinds.

† Vocabula *æstivatio*, *foliatio*, *vernatio*, etsi a Schleidenio solito acumine strictius limitata, tamen a plerisque botanicis adeo confusa ac commutata fuerunt, ut termini quibus usus sum, ab ill. All. Braunio propositi, a cl. Casparyo aliisque adhibiti, mihi multo magis,—utpote felicissime concepti, atque significationem prima fronte exprimentes,—arrident.

bus anantheris, ungues petalorum subæquantibus, inter sepala lateralia et anticum sitis, in alabastro rectis. Ovarium stipitatum, exsertum, oblongum, circ. 12-ovulatum, stipite calycis tubo adglutinato; stylo longo filiformi, ptyxi circinata, stigmate simplici coronato. Legumen ignotum.

Frutex Austro-chinensis, foliis abrupte pinnatis, stipulis parvis intrafoliaceis, paniculis axillaribus et terminalibus, pedunculis basi bracteis magnis coloratis suffultis.

L. rhodostegia; frutex 3–5-pedalis, erectus, cortice griseo-brunneo ruguloso nitidulo obductus, foliis alternis 6–9-pollicaribus crescentiparipinnatis, petiolo inferne nudo supra canaliculato, foliolis 4–6-jugis brevipetiolulatis coriaceis integerrimis marginatis lanceolato-oblongis basi rotundatis apice obtuse caudato-acuminatis $1\frac{3}{4}$–$3\frac{1}{2}$ poll. longis $\frac{1}{2}$–1 poll. latis glaberrimis utrinque nitidis, venis primariis crebris patentibus, venulis densis reticulatis, omnibus in sicco utrinque prominulis, stipulis parvis subulatis ciliatis, paniculis 6–8 pollices longis, rachi pilis brevibus tomentella, floribus circ. 10-linealibus, calyce sordide rubro, petalis saturate violaceis, pedicellis calyci fere æquilongis basi bractea eos parum excedente ovato-oblonga tomentella obtusiuscula cum bracteolis lineari-oblongis tomentosis et ciliatis basi connatis ipso tubo triplo brevioribus pulchre roseis suffultis.

Ad ripas scopulosas, præruptas, amnis "West River" ab Anglis dicti, in fluvium Cantoniensem influentis, ultra pagum Luk-po centum mill. pass. occidentem versus, supra metropolin australem, m. Junio 1865, lætus detexit T. Sampson, insomnis botanophilus.

Stirps eximia, floribus calyce rubro corollaque atro-violacea spectabilibus inter bracteas magnas roseas eas § *Stœchadis* gen. *Lavandularum* mire referentes nidulantibus, e longinquo conspicua et maxime decora, typum sistit generis distinctissimi, inter *Amherstieas* pone *Heterostemonem* collocandi, characteremque sectionis a præclaro Benthamio datum paulo infirmantis.

NOTE ON *HYPERICUM UNDULATUM*, *Schousb.*

By H. F. Hance, Ph.D., etc.

With reference to this plant, the various synonyms of which have been given, as verified from authentic specimens, by Prof. Babington, at page 97 of the second volume of this Journal, it may be interesting

to note how well the species was understood two years previously by the late venerable Prof. Treviranus, an excellent botanist, who possessed a profound critical knowledge of the European Flora. At page 9 of his work, 'In Hyperici Genus ejusque Species Animadversiones,' published towards the close of 1861, I find the following words :—"*Hypericum quadrangulum*, E., in jus speciei restituatur, et erit itaque *H. undulatum*, Schousb. Flores magnitudine illis *H. tetrapteri* accedunt. Ab isto tamen non licet separare *H. Bæticum*, Boiss.,* quoad specimina a Bourgæo in Hispania lecta et plantam e seminibus Hispanicis in hort. bot. Lipsiensi cultam. *H. undulati* corymbus contractus, qui *H. Bætici* laxus patulus, sed in hoc nulla quidem constantia. An *H. Afrum*, Lam., Desf.? Ita videtur, si caulem suffruticosum excipias, qui a loco natali potest proficisci. Certius idem, fide speciminis ex ins. Açorum, est *H. decipiens*, Wats." I may also remark that, though Nyman, in his 'Sylloge,' placed *H. Neapolitanum*, Ten., as a synonym of *H. tetrapterum*, its identity with *H. undulatum* was pointed out twenty-three years ago by Gussone (Flor. Sic. Synops. ii. 379), from the examination of De Candolle's herbarium. I am not aware on what grounds Prof. Babington (to whose paper in the first volume of the Trans. Bot. Soc. Edinb. I have not access) and Mr. Bentham apply the name of *H. quadrangulum* to *H. tetrapterum*, in opposition to the opinion of Fries, Spach, Koch, Godron, Fenzl, and Treviranus. Fries distinctly states (Nov. Fl. Suec. ed. alt. p. 236), that he himself first gathered it in 1819 in Sweden, where it only occurs in the province of Scania; and moreover, irrespective of other arguments, Linnæus's description agrees better with the *H. dubium* of Leers. (Compare

* Kunze held a different opinion; he writes (Chloris Austro-Hisp., p. 36), "*H. undulatum*, Schousb., cujus specimen Maderense et culta ex horto Berolinensi comparamus, panicula laxa ejusque ramis paucifloris, ovariis acutioribus nec truncatis et foliorum reticulo ab *H. Bætico* omnino differt; sed cautius ab *H. tetraptero*, Fries, distinguendum, et vix ovario truncato satis diversum."

[It may be desirable to add here the following note from Boissier.—EDITOR. *Hypericum Bæticum.* "Cette plante pourrait bien n'être qu'une variété de l'*H. undulatum*, Schousb. in Willd. Enum., espèce jusqu'ici très-mal connue, réunie mal à propos par les auteurs modernes à l'*H. tetrapterum*, dont je n'avais nulle connaissance lorsque je publiai mon Elenchus, mais que j'ai reçue depuis de Turyn, de Portugal et des environs de Madrid. Cet *H. undulatum*, très-voisin de ma plante par son port et ses caractères, s'en distingue pourtant par ses feuilles évidemment ondulées sur les bords, sa panicule plus contractée, ses sépales plus aigus, acuminés, très-entiers, et presque dépourvus de points noirs sur les bords."—Boissier, 'Voyage Botanique dans le Midi de l'Espagne,' tome ii. p. 724. Paris, 1839–45.]

Visiani's remarks, Flor. Dalmat. iii. 153.) By some strange confusion, the late Dr. Bromfield (Fl. Vectensis, 87) says the *H. dubium* of Leers and British authors is the *H. quadrangulum*, L., and, immediately after, describes *H. tetrapterum* under that name.

Whampoa, South China, June 30, 1867.

PLANTS OF SOUTH PEMBROKESHIRE.

By Henry Trimen, M.B. Lond., F.L.S.

Whilst staying at Tenby during August last (1867) I noticed in the vicinity of that town the following species, which, as they are not included in Professor Babington's list of South Pembrokeshire plants printed in this Journal (Vol. I. pp. 258–270), it is advisable to put on record.

Papaver dubium, *L.* (P. Lamottei, *Bor.*)
P. somniferum, *L.* Not native; a few stray plants.
Cardamine sylvatica, *Link.*
Lepidium campestre, *Br.*
Silene Anglica, *L.*
Stellaria uliginosa, *Murr.*
Acer Pseudo-platanus, *L.* Common in hedges. I did not observe A. campestre, though I searched for it.
Geranium pusillum, *L.*
G. Robertianum, *L., var.* purpureum, *Forst.*
Erodium maritimum, *Sm.*
Euonymus Europæus, *L.*
Trifolium fragiferum, *L.*
Œnothera biennis, *L.* Abundant on Tenby sand-hills.
Lepigonum neglectum, *Kindb.*
Spergula arvensis, *L.*, *var.* *α.* (Bab. Man.).
Petroselinum sativum, *Hoffm.* Thoroughly naturalized on St. Catherine's Island.
§ Sium angustifolium, *L.* Pond in Penally Marsh.
Petasites fragrans, *Presl.* Well naturalized in many places.
Antennaria dioica, *Gært.*
§ Arctium intermedium, *Lange.* (A. pubens, *Bab. Man.* v.) Lydstep.
Vaccinium Myrtillus, *L.*
§ Cuscuta Epithymum, *L.* Sparingly on Rosa spinosissima and Galium verum. Penally burrows.
Antirrhinum Orontium, *L.*
Veronica Buxbaumii, *Ten.*
§ Mentha sativa, *L.;* genuina, *Syme.* Hollow-ways, Waterwinch.
§ Rumex pratensis, *M. and K.* A few plants with R. crispus and R. obtusifolius. Scotchborough.
§ Polygonum nodosum, *Pers.* Cornfields, Tenby.
§ Salix Smithiana, *Willd.* Hollow-ways.
S. cinerea, *L.*; *γ.* oleifolia, *Sm.*
S. repens, *L.;* *β.* fusca, *E. B.*
Populus tremula, *L.*
Endymion nutans, *Dum.*
Luzula congesta, *Lej.*
Potamogeton polygonifolius, *Pourr.*
Scirpus maritimus, *L.*

Eleocharis multicaulis, *Sm.*
Carex pulicaris, *L.*
C. distans, *L.* Cliff between Giltar Head and Lydstep.
§ Avena pratensis, *L.* Penally barrows. Hoyle's Mouth.
Poa nemoralis, *L.*
Festuca uniglumis, *Sol.*
Serrafalcus secalinus, *Bab.*
§ Lastrea æmula, *Brack.* Not seen growing by me, but shown me in a fresh state recently dug up. Near Tenby.
Equisetum sylvaticum, *L.*

The mark § prefixed signifies that the plant is not given as an inhabitant of Sub-province 17 (South-west Wales) in the 'Supplement to Cybele Britannica.'

A few other species, not included in Professor Babington's list, are mentioned by Mr. Edwin Lees in a paper published in Phytol. O. S. iv. 1013.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Association met at Dundee, under the Presidentship of the Duke of Buccleuch, on the 4th of August, and continued sitting till the 11th. As a whole the meeting was a large and successful one, but there was a comparatively small attendance of botanists, and, with one or two exceptions, the papers likely to be interesting to our readers were not of much importance. We give a complete list of them, and abstracts of several. The meeting for 1868 will be held in Norwich, about the middle of August; and, as it will be presided over by Dr. J. D. Hooker, we trust that botanists will show their appreciation of this honour done to their science by being present in force and contributing papers worth the attention of the assembled *savants.* If they do so, there may be a hope of a separate Botanical subsection, where papers would not be overpowered by zoological discussions, nor read to an audience indifferent to them.

On British Fossil Cycadeæ. By W. Carruthers.

After describing the structure and peculiarities of living Cycads, the author gave a history of our knowledge of the known British fossil species. Two genera have been described—*Clathraria,* by Mantell, from the Wealden, and *Cycadoidea,* by Buckland, from the Purbeck.

Clathraria had a simple or bifurcated stem, with the internal structure of *Cycas*. The lozenge-shaped scars are alternately large and small, as in the recent genus, showing the close relationship between the living plant and the fossil; and this is further established by the fruits which have been found in the same beds, and which agree generally with those of *Cycas*. Four species have been found—three from the south of England (*Clathraria Lyellii*, Mant., *C. Mantelli*, Car., and *C. Bucklandii*, Car.), and one by the late Hugh Miller, at Brora, in Scotland (*C. Milleri*, Car.). A cylindrical stem, having the general appearance of *Clathraria*, but with uniform scars on the stems, and seeds in terminal cones, was named by the author *Yatesia*, after a member of the Association who had first drawn his attention to the fossil, and who had rendered him great help in his researches. A single species of this genus occurs in England (*Y. Morisii*, Car.), and three have been found in France. Buckland's genus *Cycadoidea* had bulbiform trunks, with small branches, which differed from the bulbils of recent Cycads in that they were permanently attached to the stem. In addition to the three species already known (*C. megalophylla*, Buck., *C. microphylla*, Buck., and *C. pygmæa*, Lindl. and Hutt.), Mr. Carruthers described one which had been found by Mr. Charles Peach at Helmsdale, and which the author dedicated to that distinguished naturalist (*C. Peachii*, Car.), and a fifth species had been obtained from the Potton Sands. The most remarkable form described was one to which the author gave the name *Bennettites*, after his colleague, whose advice and assistance in this, as in every other work in which he had been engaged, had been of more value than he could express. Two species were described, both from deposits in the Isle of Wight (*B. Saxbyi*, Car., and *C. Gibsoni*, Car.). One had been exhibited and shortly described to the Linnean Society by Robert Brown. The genus was characterized by having an elliptical bulbiform stem, a single woody cylinder, from which the vascular tissue for each leaf separated *en masse*, as in the stem of ferns, but passing outwards through the cortical cellular layer. The structure of the fruit was minutely described. It was borne on short branches; the seeds were supported on the ends of branched vascular bundles, which the author considered analogous to the altered fruit-bearing leaves of the genus *Cycas*, but wanting the cellular tissues which form the blade of the leaf. The various genera represented the two subtribes of recent Cycads, while *Bennettites* shows a structure

which, while it approaches nearer to *Cycas*, yet is sufficiently different to form a distinct tribe of equal value with the other two.

On Calamiteæ and Fossil Equisetaceæ. By W. Carruthers.

Having introduced his subject by describing the structure of the recent genus *Equisetum*, he described the various fossil stems that had been considered to be allied to this genus. While true specimens of *Equisetaceæ* had been found fossil, the great majority of the stems referred to this Order were very different, and those belonging to *Calamites* had a structure unlike anything known in this or in any other Order of *Acotyledons*. The most important characters were obtained by botanists from the fructification; and the author had obtained, through the kindness of Dr. Hooker, sections of vegetable structures prepared by Mr. Binney, whose extensive acquaintance with coal plants was well known. He had discovered, in some of these, fruits which belonged to *Calamites* so beautifully preserved that the most minute details could be determined, and, with the help of his diagrams, he described their structure and illustrated the various points in which they agreed with and differed from the fruits of the recent *Equisetaceæ*. He then described the foliage which had been certainly found connected with *Calamites*, and which had been named *Asterophyllites;* and he showed that as similar fruits had been found associated with *Annularia* and *Sphenophyllum*, which differed from *Asterophyllites* only in the amount of cellular tissue spread out on the veins, there could be no doubt that these also were the foliage of members of this large genus or tribe of plants. *Calamites* he considered to represent a new Natural Order, more highly organized than any Acotyledonous Order, but certainly belonging to this great class of plants.

On the Fruit of a Pandanus from the Great Oolite. By W. Carruthers.

The specimen belonged to the Northampton Museum, and had been brought under his notice by his friend Mr. S. Sharp. He believed it to be nearly allied to, if not identical, with the imperfectly-preserved cone which Lindley figured under the name of *Strobilites Bucklandii*, but he was unable to determine its affinities on account of its state of preservation. It differed very greatly from Buckland's *Podocarya*,

which was the only fossil Pandanaceous fruit known, and approached nearer to the structure belonging to the recent family, and more especially to the section of the genus *Pandanus*, which had single-seeded drupes.

Carboniferous Fossil Trees embedded in Trappean Ash in the Isle of Arran. By E. A. Wünsch.

The beds in which these occur have hitherto been classified as trap-dykes or eruptive sheets of trap-rock, but a summer's residence in the island has enabled Mr. Wünsch to discover the true character of the rocks. The beds referred to extend in a north-easterly direction, at an angle of about 37° from high-water mark, down to low-water mark, and doubtless to some distance below it, with the stems of trees embedded at right angles to the plane of stratification, having retained the original position in which they grew, and having subsequently been upheaved on the flanks of the granitic nucleus of the island. As many as twelve or fourteen trunks have been observed on different occasions, and within a circumscribed area. The stems of the trees are perfectly cylindrical, from 15 to 20 inches diameter, with their roots extending down into the subsoil; one of them, a *Sigillaria*, must have been a hollow cylinder, through the interior of which several vigorous young shoots had made their way at the time it was suddenly buried by a shower of ash. Another tree must have been perfectly hollow, filled up with *débris* of vegetables and with cones. Mr. Binney, of Manchester, who has undertaken to make a more minute examination of the plants, has found specimens of *Sigillaria*, *Halonia*, *Lepidodendron*, and a species as yet undescribed. The ash itself is very much indurated, having, in fact, almost the appearance and hardness of ordinary trap-rock. So far as known, the trees referred to are the only instances of carboniferous trees preserving both their original outline and position, and their internal structure.

Exploration of the Plant-beds of North Greenland.

The Secretary read the preliminary report of the "Committee for the Exploration of the Plant-beds of North Greenland, appointed at the Nottingham meeting in 1866." The report was as follows:—
"Mr. Whymper, one of the members of the Committee, having made

arrangements for visiting Greenland, a meeting of the Committee was held on the 4th of April, in London, and it was there resolved that the sum of £100 voted by the British Association for the purposes of this exploration, be handed to Mr. Whymper on his giving a written undertaking to fulfil the conditions laid down by the Association, as far as lay in his power. In addition to this grant, Mr. Whymper was further assisted by a grant of £200 from the Government Grant Committee of the Royal Society." Mr. Whymper started from Copenhagen about the 20th of April, taking with him, as assistant, Dr. Robert Brown, a gentleman already well known for his explorations in north-western America, especially as to the natural history of British Columbia. Since the expedition left Copenhagen no intelligence from it has been received by this Committee. The description of the plant-remains from North Greenland, which have been already brought to this country, has been completed by Professor Oswald Heer, and his work on the 'Fossil Flora of the Polar Regions' is now nearly printed, and will be published in a short time.

On the Leaf-beds of Hampshire Basin.

Mr. W. Stephen Mitchell read the report of the "Committee appointed to investigate the Leaf-beds of the Lower Bagshot Series in the Hampshire Basin." He pointed out that there was a better chance of determining the remains from these beds than those from many others. They were more perfect in themselves, and many of them had very characteristic forms. The forms he adduced (which he admitted were the best) were several specimens nearly approaching *Cussonia Natalensis*, in its leaf, and separately a fruit very like that of *C. paniculata*; fruits like *Dalbergia rufa*, and leaves also of *Dalbergia*; leaves in shape in venation, like *Dryanandra foliata*, but larger; and palm leaves which agreed with those of the Sabal. He laid stress on the fact that we know the age of the beds from stratigraphical independent of botanical evidence.

On the Occurrence of Aster Salignus, Willd., in Wicken Fen, Cambridgeshire. By Mr. P. Hiern.

Wicken Fen, about ten miles from Cambridge, is a large, wild, uncultivated tract of peat overlying a basin of gault, producing sedge,

and cut up with ditches. On August 23rd last, the writer found growing, in an apparently wild state on the fen, several plants which he refers to Willdenow's species *Aster salignus*. This species is nearly the only one, out of about seventy closely-allied Asters, which is a native of Europe, while the rest are American. It grows wild in Germany and Denmark, in many places by the banks of rivers, and, therefore, might probably occur in Britain in such a locality as Wicken Fen. It is not a plant in ordinary cultivation, and could not, therefore, easily escape from a garden. Specimens from Wicken have the habits of wild plants. A living specimen has been placed in the Cambridge Botanical Garden.

ON THE DESTRUCTION OF PLANTATIONS AT DRUMLANRIG BY A SPECIES OF VOLE. By Dr. Grierson.

The ravages of one or more species of *Arvicola*, or Vole, in the plantations of Drumlanrig, in Dumfriesshire, have been for years increasing. As far as I can learn, this was not specially noticed until about the year 1852. Since then very great injury has been done. The voles seem to have migratory habits—at times appearing in vast numbers in plantations where they had not been previously noticed, and which they almost completely destroy. The destruction is principally among the young trees of Oak and Ash. A ring of bark is gnawed from the stem close to the root, where it is hid by grass or moss, and this causes the death of the tree. Plantations are liable to these attacks until they are of more than twelve years' standing. The bark is almost wholly removed from trees of Holly, even that of the small branches. Larch and Pines, as far as I know of late years, have not been attacked, but I have heard of Larch plantations being much injured by what I presume to have been a vole. It is in the winter months that the destruction chiefly takes place, especially when the ground is coverd'd with snow. I do not know of any like injury having been noticed in other localities in the south of Scotland, although it is recorded as having occurred in other places, as in the New Forest. In the examination of hundreds of voles, obtained from the Drumlanrig plantations, I distinguished two species, *Arvicola pratensis* and *A. agrestis*. The former bears but a small proportion in number to the latter—about one to twenty. Probably another species of small vole occurs in moorland districts, but it does not appear to injure

plantations. The only method adopted for the destruction of the voles is that of digging pits wider at the bottom than at the mouth, into which many fall, and are there killed or allowed to die. The number thus destroyed have, however, no sensible effect in lessening the swarms. There can be little or no doubt that the enormous increase is owing mainly to the relentless extirpation of rapacious birds and weasels, which are the natural police of the forests to maintain a balance of power. While nature gave unlimited fertility to the rodents, she bounded their destructive increase by the carnivores, and it is not wise for man, for the sake of amusement, to disturb that order. Nature will not suffer him with impunity to sacrifice her offspring for game. Judgment will be upon him,—the forests become blighted, the land overrun with vermin, and he repents of the injury that he has done to the hawks, the owls, and the weasels.

Professor Dickson exhibited an abnormal leaf of *Prunus Laurocerasus*.

The following papers bearing on botanical subjects were also read to the Association:—

Dr. Maxwell T. Masters.—On Polliniferous Ovules in a Rose (*Rosa arvensis*). This will be published in extenso in our next, with an illustration.

Dr. Lauder Lindsay.—On the present uses of Lichens as dye stuffs.

Dr. Lauder Lindsay.—Is Lichen-growth any criterion of the age of prehistoric structures?

Dr. Lauder Lindsay.—Is Lichen-growth detrimental to Forest and Fruit Trees?

Dr. Lauder Lindsay.—On Plant Acclimatization in Scotland, with special reference to Tussac Grass.

Dr. Lauder Lindsay.—On the Conservation of Forests in our Colonies.

E. J. Lowe.—On the Abnormal Forms of Ferns.

Dr. Fraser.—On the occurrence of a new British Moss in Dovedale.

Professor Balfour.—Notice of some rare Plants recently collected in Scotland.—He noticed specially, *Apera interrupta*, Beauv., from Dirleton Common, near Edinburgh; *Phyllodoce cærulea*, Bab., from the Sow of Athole, Perthshire; *Polypodium alpestre*, Hoppe, and *P. flexile*, Moore, from Ben Aulder; and an apparently undescribed *Carex* from the Sow of Athole.

Professor Charles Martins exhibited specimens of the aerial roots of *Jussiæa repens*, and specimens of the plant cultivated under different biological conditions, illustrating the curious memoir he recently contributed to the Académie des Sciences de Montpellier, and published in the volume of their Transactions for 1866.

UNRECORDED STATIONS OF, AND NOTES RESPECTING SOME PLYMOUTH PLANTS.

By T. R. Archer Briggs, Esq.

Barbarea intermedia, Bor.—Plentiful by the side of a road near Heathfield House, Knackersknowle. May, 1867. It is perfectly established in the neighbourhood of King's Tamerton, growing about quarries and in waste spots.

Sagina ciliata, Fries.—On a bank at Honicknowle; on another, near a farm, between Noss Mayo and Revelstoke churchyard; and with *S. apetala*, L., on a cliff near the latter spot.

Cerastium tetrandrum, Curt.—Not uncommon in the neighbourhood of tidal rivers, or near salt water; on a wall near the Hoe, Plymouth; on walls at Devonport, Down Thomas, Beer Ferris, and Wembury. In waste spots at King's Tamerton, Blaxton, Oreston, and sparingly at Cattedown. *Cerastium semidecandrum*, L., seems not to occur at all near Plymouth.

Hypericum undulatum, Schousb.—Abundant about the boggy source and the higher part of a stream in a wood between Common Wood (a previously-recorded station) and Rumple Quarry; tolerably plentiful in a moist valley to the south of this, below Rock Brake; in boggy spots on Derriford estate, and in a valley between it and Coldridge, Egg Buckland.

Oxalis corniculata, L.—Very rare in this part of Devon; near Plymouth only by a roadside; near a garden, at King's Tamerton, where I have noticed it for two years past.

Lotus angustissimus, L.—In old uncultivated pasture land, patched with *Ulex Europæus*, F.; above a cliff, between Wembury church and the estuary of the Yealm. Sept. 1867.

Lotus hispidus, Desf.—With the last. Cultivation has probably much restricted the range of these two plants in this neighbourhood.

A spot between this station and Bovisand, whence I recorded both last year, was this summer an oat-field.

Prunus cerasus, L.—Common in hedgerows near villages or old houses. Unlike *P. Avium*, L., it, with us, always occurs in situations where we may suspect it of being either planted, or an escape from cultivation.

Agrimonia odorata, Mill.—Not a rare plant in some localities near Plymouth. On a hedgebank near Thornbury, at Derriford, and elsewhere in the parish of Egg Buckland; by the Tavistock railway above Bickleigh Vale; near Hemerdon, Plympton St. Mary; at Cromwell Cross, Modbury, with *A. Eupatoria;* by the path from Lea Mill Bridge to Stretchley Farm; and in the neighbourhood of Ermington.

Rosa micrantha, Sm.—Two or three bushes of the naked-peduncled variety (*vide* Seemann's Journ. Bot. Vol. IV. p. 287); in bushy spots on limestone between Pomphleet and Plymstock; one in a hedgerow near Lynham, and another by the inlet from the Yealm below Spriddlestone, where the typical form also occurs.

Anthriscus vulgaris, Pers.—So rare about Plymouth that I have only seen it in one locality, near Tamerton Foliott, there it grows on a dry hedgebank by the footpath to Blaxton. Plentiful there in May, 1867.

Arctium majus, Schott.—Uncommon. In a waste spot by the Plymouth and Totnes Road, near Yealm Bridge; near Brixton, by the side of the Plympton Road.

Arctium minus, Schk.—Common. Often with white flowers about Elburton, Stadiscombe, etc.

Campanula rotundifolia, L.—Very rare in this part of Devon. On a hedgebank between Beer Alstone and Lopwell; in two spots on a bank near Kingsand Village, Maker.

Vinca minor, L.—Apparently quite wild in a copse, and on an adjoining bank between Dunstone and Newton Ferrers; perhaps also indigenous near Plympton Maurice, and in Saltram Woods. Not rare in suspicious situations in the neighbourhood of villages or old farmhouses. Compton, given as a station for the variety with white flowers in the 'Flora Devoniensis,' is a very unsatisfactory one.

Calamintha menthifolia, Host., *β; C. Briggsii*, Syme, Eng. Bot., 3rd ed.; *C. officinalis*, Mœnch?, var. *β*. Bab. Man., 6th ed.—On a hedgebank near Penguit, Ermington; by a roadside at Wembury, on the right as you ascend the hill towards Langdon; on a bank between Sequer's Bridge and the Plymouth and Totnes Road.

Chenopodium Bonus-Henricus, L.—Very rare within twelve miles of Plymouth. I have only seen it by the roadside at Puslinch Hill, close to Puslinch House. The garden is very near, and thence probably the plant was derived, but is now quite naturalized.

Humulus Lupulus, L.—Truly wild in the valley of the Yealm near Yeo. Frequent in hedgerows in damp situations, but generally when they are near villages or houses.

Orchis Morio, L.—In an uncultivated bushy spot, on limestone, adjoining Radford quarry, near Plymstock (*vide* Seemann's Journ. Bot. Vol. IV. p. 293).

Typha angustifolia, L.—In a marsh by the Tavy, at Lopwell, where the commoner *T. latifolia*, L., also occurs. *T. angustifolia* is, I believe, new to the county.

All the places mentioned above are in Devon.

4, *Portland Villas, Plymouth, September* 23, 1867.

CORRESPONDENCE.

On Pleurococcus Beigeli.

According to Dr. Tilbury Fox's letter in the August number of this Journal, we have to record a new stage into which Dr. Fox's knowledge of *Pleurococcus* entered. That gentleman's first opinion was, that my *Pleurococcus* was identical with *Zooglea capillorum*. Some weeks later he was quite sure—because a friend of his well versed in microscopic examination of minute life told him so —that my *Pleurococcus* was nothing but Gregarines, which he had growing in a saccharine solution, and which he promised to bring before the Pathological Society, but which he never did. Dr. Fox's third opinion was, that my *Pleurococcus* was a new *fungus*, and he (Dr. F.) its discoverer. His fourth opinion, *Pleurococcus Beigeli*—notwithstanding what authorities of world-wide renown might think—did not exist at all, and must now be considered "defunct."

Now, I humbly submit that, before accepting this conclusion, it would be advisable to wait for the next development of Dr. Fox's opinions; for I am afraid that he will as little be able to declare *Pleurococcus* as "defunct" as he was to exalt it to the rank of a *Gregarine*. The way which led Dr. Fox to the last conclusion is as curious as it is new in science. Up to the present time it has been customary—and, as it seems, will be so in future—to assign reasons for abandoning one opinion and accepting another. This custom Dr. Fox thinks old-fashioned and superfluous, saying only, "I did one thing—thoroughly demolished *Pleurococcus Beigeli*. It (the paper in the 'Science Gossip') showed that the fungous growth on the hair was only a modification of a well-known form." I can only advise Dr. Fox to read his paper again, and he will alter his opinion.

To enter into its contents would be quite superfluous, since the only point of our controversy—the priority of discovery—has been conceded to me by Dr. Fox; while the decision of the next question—concerning the nature of the growth—does not depend on Dr. Fox's opinion, though he supposes "no one in this country has gone into the subject of vegetable parasitic diseases and the artificial growth of fungi more fully" than himself. Of course I do not doubt the correctness of this statement, and can only deplore that so much labour has been crowned with so very little success, that he is obliged to change his opinion on a modification of a *well-known form* as often as he speaks or writes about it. With regard to Gregarines, Dr. Fox says that he has used the term "in the same sense as that in which Lindemann employed it." I hope, with Mr. Ray Lankester, "than whom no higher authority on this point exists," "that it (the term *Gregarine*) may never be again misappropriated thus."

Sorry I am to destroy Dr. Fox's victory over poor *Pleurococcus*,—for I am obliged to give publicity to a letter of Professor *Robin*, of Paris, whose authority in these matters I hope even Dr. Fox will recognize. It runs thus:—

"I have examined, together with Dr. Beigel, some preparations which we have made of a growth taken from artificial hair. This examination convinced me that the vegetable growth is really a new species of *Pleurococcus*, as already recognized by Rabenhorst and Küchenmeister.—Dr. CHAS. ROBIN, *Professeur à la Faculté de Médecine de Paris. Paris, 18th August*, 1867."

I also insert here the botanical description of *Pleurococcus Beigeli* as published by Rabenhorst, 'Sitzungs-Berichte der Isis,' 1867, April–June, p. 51:*—

"*Pleurococcus Beigelii*, Küchmst. et Rabenhorst. *P. aerus*, minutissimus, capillos emortuos zonatim cingens, sordide griseo-fuscescens; cellulis globosis vel muta pressione angulosis $\frac{1}{850}$–$\frac{1}{500}'''$ crassis, dilutissime viridibus vel achrois, in familias numerosas conglobatas consociatis, muco matricali gelatinoso achroo firmo involutis; cytiodermate suberasso, achroo, hyalino, homogeneo; cytioplasmate subtilissimo granulato; sporangiis plerumque $\frac{1}{235}'''$ crassis, gonidia 12–20 foventibus.

"Forms dirty brownish, nodous thickenings on the hair. If moistened with water they are easily removable. The single cells are mostly round, and at the act of partition are as large as $\frac{1}{500}$ part of a line. After partition the young cells attain very soon $\frac{1}{850}$ part of a line in diameter. They are white and transparent, but sometimes with a light green tinge. They are united in groups, and involved in a rather thick, colourless mucus. The cell-membrane is so thick as distinctly to show a double couture, but no layers are visible. It is homogeneous, and light like glass."

* In the paper above quoted Dr. Rabenhorst also described a second *Alga* found on rejected chignon-hair, which I forwarded to him. The following is a copy of the diagnosis:—

"*Glœotheca trichophila*, Rabenh. *G. aerea*, trichophila, sordide fuscescens; cellulis anguloso-rotundatis vel oblongis elliptisve diametro ($\frac{1}{720}'''$) subduplo longioribus, saturate purpureo-violaceis, seriatim dispositis; cytiodermate tenuissimo; tegumentis crassissimis gelatinosis sublamellosis, plerumque confluentibus achrois."

May I request Dr. Fox to come forward, and to show where Professors Robin and Rabenhorst are wrong, and on what grounds he declares *Pleurococcus* to be "defunct"?

But for Heaven's sake, no fifth opinion!

3, *Finsbury Square; 15th September*, 1867. H. Beigel, M.D.

NEW PUBLICATIONS.

Genera Plantarum, ad Exemplaria imprimis in Herbariis Kewensibus servata definita. Auctoribus G. Bentham et J. D. Hooker. Vol. I.: sistens Dicotyledonum Polypetalarum Ordines LXXXIII. (Ranunculaceas—Cornaceas). Londini: L. Reeve et Co.; Williams et Norgate. 1862–1867.

Every systematic botanist will rejoice at the completion of the first volume of Bentham and Hooker's great work on the genera of plants. The third part having just appeared, containing a conspectus of the whole Polypetalous Orders, and characters to different genera belonging to *Melastomaceæ*, *Lythrarieæ*, *Onagrarieæ*, *Samydaceæ* (including *Homalineæ*), *Loaseæ*, *Turneraceæ*, *Passifloreæ* (including *Malesherbiaceæ* and *Papayaceæ*), *Cucurbitaceæ* (including *Nandirhobeæ*), *Begoniaceæ*, *Datisceæ*, *Cacteæ*, *Ficoideæ* (including *Tetragoniaceæ* and *Mollugineæ*), *Umbelliferæ*, *Araliaceæ* (including *Helwigiaceæ*), and *Cornaceæ*. The genera *Euptelia* and *Trochodendron*, which were first indicated in this Journal as constituting a distinct group of plants, are referred in the Supplement as a tribe to *Magnoliaceæ*, whilst *Vochysiaceæ* are referred to the neighbourhood of *Polygaleæ*.

It will be seen that five years have elapsed since the first part of this volume came out; and if the publication does not proceed at a more rapid rate, it will take at least ten years more before the whole work can be completed. The task still to be accomplished is a gigantic one, and will no doubt be performed as satisfactorily as that already done. We wish the illustrious authors health and sufficient leisure for it. They have done an immense service to science; and though their definitions of genera and arrangements may in some instances be objected to, their 'Genera Plantarum' will for many years to come be what Endlicher's has been up to this time, and will be until it shall have been quite superseded by the work now under notice.

Enumeration of Hawaiian Plants. By Horace Mann. Reprinted from the Proceedings of the American Academy of Arts and Sciences, vol. vii., Sept. 1866. Issued July, 1867. Cambridge, United States: Welsh, Bigelow, and Co. 1867.

During Mr. Mann's visit to the Sandwich or Hawaiian group, he visited five of the larger islands, and brought together a collection which forms the basis of this enumeration. On his return to the United States he examined the collections of Wilkes's Expedition and sets of specimens gathered by Remy, Macrae, Gaudichaud, Chamisso, Douglas, and Nuttall. But he had no opportunity of seeing the rich collections made in the islands by Nelson, Menzies, and Barclay, which we have in London, and which have as yet been examined but partially, so that his 'Enumeration,' though it is the most complete as yet published, will receive considerable addition from the sources indicated.

Mr. Mann prefaces his 'Enumeration' by an historical notice of the different botanists whose visits to the islands have contributed to make us acquainted with the Hawaiian flora, beginning with David Nelson, who, in 1778–1779, accompanied Captain Cook, and ending with Hillebrand and Brigham. We observe, however, that he omits to insert, between the visits of Nuttall and Remy, the two of H.M.S. Herald, an account of which was published in the 'Kew Miscellany.'

This historical notice is followed by a geographical notice and the enumeration of the plants. Omitting for the present the Grasses, Mosses, and *Hepaticæ*, the author enumerates 796 species, 129 of which are Lichens, and 116 Ferns. Many new species and the following new genera are described, viz. *Alsinodendron (Alsineæ)*, *Platydesma (Rutaceæ)*, and *Brighamia (Lobeliaceæ)*. One of the *Araliaceæ* is also the type of a new genus.

We congratulate Mr. Mann on the completion of his useful Enumeration, and trust that when he shall have added the three important Orders at present omitted, he will enter into some phyto-geographical considerations of the composition of the Hawaiian flora.

MEMORANDA.

Allium Carinatum, a new British Phænogam.—*Allium carinatum*, L., was formerly considered as a British species, but the plant figured for it in 'English Botany,' and what has since been gathered for it, has proved to be a mere broad-leaved variety of *A. oleraceum*. At the last meeting of the Northamp-

tonshire Field Club, we had the pleasure of receiving from the neighbourhood of Newark, but on the Lincolnshire side of the boundary, an undoubted specimen of the true *A. carinatum*, as figured by Redouté and Reichenbach, characterized not only by its lilac flowers, with the concave connivent divisions of the perianth, but by the exserted stamens. We at first referred it to *A. flexum*, Kitaibel, of which we had a fresh specimen, but that is very properly reduced by Koch to *A. carinatum*, of which it is merely a narrow-leaved form. We have lately received a tuft, consisting of more than twenty specimens, growing on sandy, wet soil, mixed with a little lime, amongst Rushes and coarse Grass. The plant was found by the Rev. W. T. Hampton, Rector of Stubton, between Brandon and Doddington. *A. oleraceum* extends eastward as far as Beluchistan, but *A. carinatum* is not an Indian plant, though it probably extends beyond Hungary.—*Rev. M. J. Berkeley in Gardener's Chronicle*, 1867, p. 973.

BOTANICAL NEWS.

Dr. Beigel has discovered another new species of *Alga* on the human body; this time on the ear. Full particulars and illustrations of it will be published in the 'Nova Acta.'

We regret to learn that Mr. Hemsley has been obliged by ill-health to resign his situation as assistant at the Kew Herbarium, and trust that in consideration of his services, some strong influence will be brought to bear upon Government to grant him a pension. Whilst hoping that Mr. Hemsley's timely removal from a place which has killed three of his predecessors,—Stevens, Black, and Smith, all young men like himself,—may be the means of restoring his shattered constitution, we trust that the cause of such repeated misfortune may be closely investigated. Is it from inhaling the poison employed in the herbarium, and the long hours that these assistants are employed in damp chilly rooms, that these fatal results are brought about, or what is it?

A new edition of Professor Asa Gray's 'Manual of the Botany of the Northern United States,' with 20 plates and analytical tables, has just been published. The great value of the work is ensured by the eminent name of its author.

Dr. Thwaites, Director of the Botanic Gardens of Peradenia, Ceylon, is about to return home, his health beginning to fail.

The Botanical Society of Canada is about to resume the publication of its 'Annals.' Botanists desirous of subscribing to this periodical may do so by paying four shillings annually. All communications are to be addressed to Dr. Lawson, LL.D., Dalhousie College, Halifax, Nova Scotia.

Dr. Caspary, of Königsberg, informs us that he has been this summer in the Black Forest and the Department of Les Vosges, with the view of studying the different forms of *Nuphar*, amongst which he found several undescribed ones. In Lake Longemer (Dep. des Vosges) he met with *Subularia aquatica*, which was growing there together with *Isoëtes echinospora* and *I. lacustris*, thus dispelling any doubts about the plant being indigenous to France.

Dr. Carus has convoked meetings of the Adjuncts of the Imperial German

Academy Naturæ Curiosorum, to be held at Dresden, on the 1st and 2nd of October.

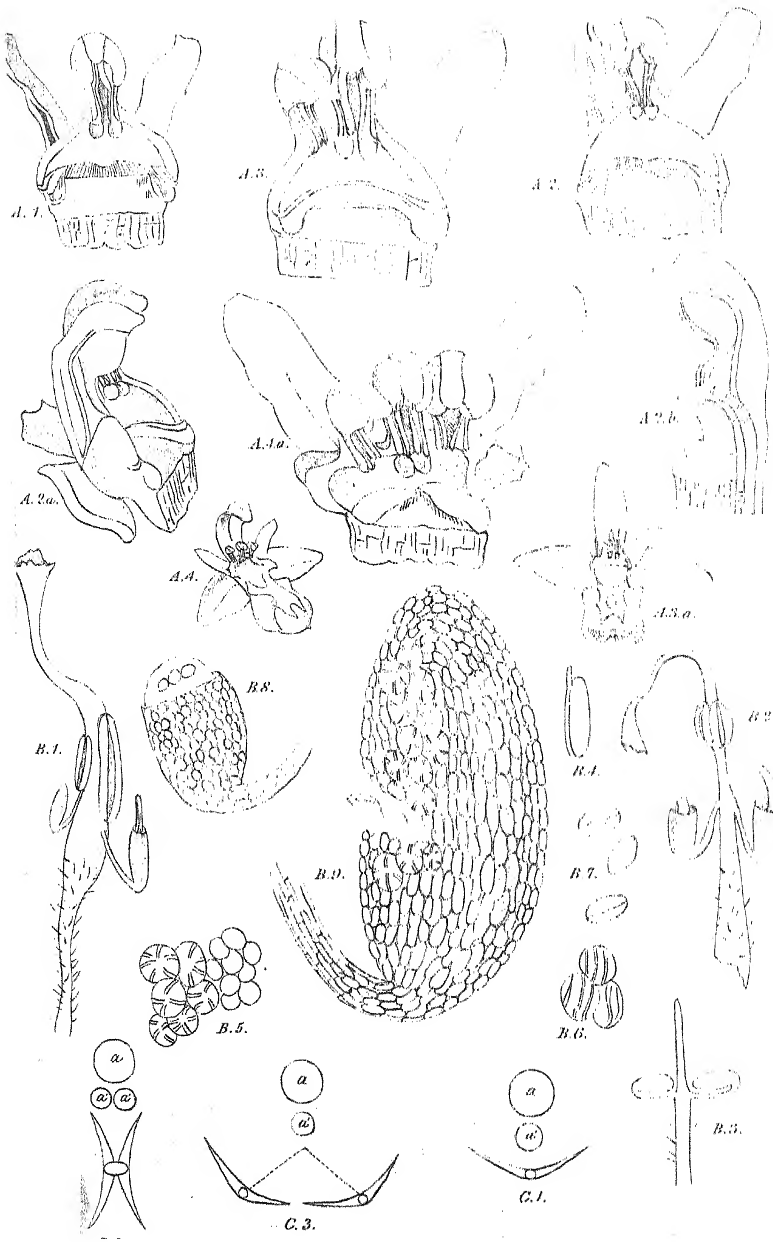
An interesting paper has been communicated by Dr. F. Buchenau, on the sculpture of the epidermis of the seed of German *Juncaceæ*, of which we may possibly publish a translation, as it enables botanists to define more accurately the different species of *Juncus* and *Luzula* than has hitherto been possible.

Of Reichenbach's 'Icones Floræ Germanicæ et Helveticæ' we have received the 16–21st fascicle of the twenty-first volume, containing the *Umbelliferæ* and concluding the volume.

A correspondent laments that "Napoleon's Willow," at Kew, has been cut down. It is now forty years since this tree was planted, and it has ever since been one of the lions of the gardens,—hundred of thousands of Englishmen looking upon it as a national historic trophy, whilst Frenchmen might be seen reverently taking off their hats, and even going down on their knees when coming into its presence. Like Herne's Oak at Windsor, Napoleon's Willow at Kew was a tree of world-wide fame. Years ago, long before Kew Gardens became national property and were open to the public, it had transpired through the newspapers that this Willow existed at Kew, and one Sunday a great many people came down from London to see it. On being refused admittance, the crowd broke open the gate, to gratify its curiosity. It is well known that every visitor to St. Helena carries away twigs of Napoleon's Willows; but what gave peculiar interest to the Kew tree was, that it was taken from the Willows which overshadowed the tomb itself, the last stumps of which were carried to France in 1840.

We have received Dr. F. Wimmer's 'Salices Europææ,' and F. W. Gissing's 'Wakefield Flora,' both of which will be duly noticed.

Mr. John M'Gillivray, late naturalist of H.M.S. Rattlesnake, died at Sydney, on the 6th of June. He had just returned from an expedition to the Richmond river, and was preparing to leave for the islands of the South Pacific when his career of usefulness was cut short by death. John M'Gillivray was the eldest son of the late William M'Gillivray, Regius Professor of Natural History, Marischal College, Aberdeen. He spent his early years in Edinburgh, and exhibited from boyhood a taste for those branches of natural science which his father cultivated with so much success. He was intended for the medical profession, and had all but completed his studies, when the late Lord Derby offered him the appointment of naturalist on board H.M.S. Fly, which was about to make the voyage round the world. On his return to England he was appointed naturalist to H.M.S. Rattlesnake, employed on the Government Survey, and recorded the results of a three years' cruise in two interesting volumes, which were favourably received by the public and the leading literary journals of the day. His next appointment was to H.M.S. Herald, and brought him to Polynesia and Australia. Owing to his intemperate habits, this appointment was cancelled. He spent nearly five years among the savage inhabitants of the South Sea Islands, where he had many strange adventures and hair-breadth escapes. He had a wonderful power of gaining the confidence and adapting himself to the manners of the cannibal tribes among whom he lived.



A. 1.
A. 3.
A. 2.
A. 2.a.
A. 4.a.
A. 2.b.
A. 4.
A. 3.a.
B. 8.
B. 1.
B. 2.
B. 4.
B. 9.
B. 7.
B. 5.
B. 6.
a
a'
a'
a
a'
a
a'
B. 3.
C. 3.
C. 1.

SOME ABNORMAL FORMS OF OPHRYS.

By J. Traherne Moggridge, Esq.

(Plate LXXII. A.)

In the number of this Journal for June, 1866, I described two remarkable flowers of *Ophrys*, in one of which a second anther was produced within the lobes of the normal one, and another in which a third rostellum was developed on the edge of the stigmatic cavity at the point where the glandular processes in *Orchis* seem to indicate the presence of rudimentary anthers.

The former of these developments may be compared with Professor Henslow's drawing and description of a flower of *Habenaria chlorantha* in the Linnean Society's Journal (ii. 104), where an intermediate anther is produced between the widely-separated lobes of the normal anther.

This is a very rare form; but the latter, in which an extra rostellum is formed on one side or the other of the anther, may frequently be observed in *Ophrys*, the genus with which I am best acquainted.

The subjects of the present notice are examples of different stages of abnormal development, and show how the petal when in connection with that part of the stigmatic cavity which sometimes produces a rostellum, is gradually modified into an anther. In all cases which I have observed, the anther when undergoing this change was sutured to the back of the stigmatic cavity, and never free.

And here I would observe that there are three abnormal conditions in which flowers may be found, each of which must be considered before one can attempt to draw specific conclusions from a "monstrous" specimen. The first question then will be whether the flower is really but *one*, or whether it may be the result of the coalition of two. This condition, in which two individuals are fused, as it were, into one, is not uncommon; and it frequently happens that the evidence of the existence of a second flower is so completely done away with that the fact becomes extremely difficult to realize.

Besides the *fusion of individuals*, we must certainly take into account the *fusion of parts* of flowers, as in the case above mentioned; and, thirdly, we must hold distinct from these examples of *free*

abnormal development which takes place in separate parts of flowers otherwise normal in their position.

The abnormal specimens of *Ophrys aranifera*, Huds., parts of which are represented at Fig. A 1, 2, 3, are subject to the second of these conditions, the petal being attached to the back of the stigmatic cavity by its outward edge. This edge divides from below, and then presents the appearance of the lowest part of the valves of the anther-cell (Fig. 1). Fig. A 2 exhibits a more advanced stage, where one cell of the anther is completely formed (Fig. 2), and contains the pollen-mass (Fig. 2 *b*). At Fig. 2 *c*, part of the stigmatic cavity, with the petal sutured on to it, is shown from the side nearest the normal anther. The gland and rostellum are wanting, as they are in all similar cases which I have examined. The specimen drawn at Fig. A 3, 3 *a*, had the second anther perfect in all respects, except that glands and rostellums were absent; the petal, out of which it was formed, being completely metamorphosed.

Professor H. G. Reichenbach figures an example of the partial change of a petal into an anther in his 'Icones,' xiii. t. 112, 464, f. 2. Fig. A 4, 4 *a*, represent a triandrous form of *Ophrys aranifera*, Huds., for the abnormal characters of which I should certainly refer to a fusion of two flowers, accompanied by suppression and modification.

The stigmatic cavity is greatly distorted, but the parts are otherwise normal in position and appearance.

All the specimens treated of were gathered at Mentone in February, 1866.

ON POLLINIFEROUS OVULES IN A ROSE (*ROSA ARVENSIS*).

By Maxwell T. Masters, M.D., F.L.S.

(Plate LXXII. B.)

(*Read September 6, 1867, before the British Association at Dundee.*)

Among the many and varied permutations that take place in the organs of plants, none are more interesting than those which affect the ovule. The main interest arises not so much from the structural conformation of the organ in question, as from the peculiarities attending its development and the functions it has to fulfil. These are points of

cardinal importance in vegetable physiology. Indeed, so far as its conformation goes, although the general features of ovule structure are tolerably well known, yet the true morphological composition of this most important part of the vegetable organization is still a matter of controversy. Whether the coats of the ovule are to be looked on as foliar organs, as modifications of the marginal lobes of the carpellary leaf, or whether they are to be considered as developments from the axis, whether the nucleus is to be regarded as a new and distinct production of a bud-like character, to which the coats act as protective scales,—all these are points, not to mention others, which are still in dispute.

It is therefore no matter for surprise that any deviations from the ordinary conformation are looked at with special interest, in the hope that they may at least supply a clue towards the unravelling of some of the mysteries surrounding the morphological nature of the ovule. At present there is no decisive evidence either one way or the other,—one set of facts and the inferences to be drawn from them being counterbalanced by another array of facts, from which opposite conclusions may be drawn.

Without going into detail at present, it may here be stated that the principal deviations from the ordinary structure of the ovule, which have, up to this time, been noticed, are these:—1. The more or less foliaceous condition of the coats of the ovule,—a state of things generally coincident with their being flattened like a leaf and not convolute or tubular. This flattening in the case of foliaceous or petal-like ovules, takes place indifferently, whether the nucleus of the ovule be present or not. This change then affects the coats of the ovule, or rather the coat, as in such instances only one is developed, and that one in a foliaceous or petaloid guise, even in plants where there are usually two or more investments to the nucleus, so that the latter organ remains almost wholly uncovered.

2. The next most common teratological change in the ovule consists in the development of a leafy shoot in the place of the nucleus. Such an occurrence has been frequently recorded, and I have myself met with numerous instances of it, but I have never been able to satisfy myself clearly as to whether the leafy shoot in question was really an exaggerated development from the nucleus or whether it was merely a new growth, distinct from that body, though occupying its ordinary position.

I may here point out that the position of the ovule, when changed in either of the ways just mentioned, is subject to variation; sometimes it is on the margin of the carpellary leaf, leading to the inference that the ovule is but a modification of the marginal lobes (Brongniart, Planchon, etc.). At other times it seems to originate not from the margin, but from the inner or upper surface of the carpel, midway between the centre and the margins, while in a third set of cases the ovules are manifestly directly attached to the axis, the carpels themselves being sometimes completely undeveloped.

These changes are usually co-existent with a leafy state of the carpel, the margins of which are generally disunited, so that the ovules sometimes lie on the surface of the open carpel, pretty much as the seeds of Conifers do on the scales of the cone. Another thing worthy of remark is the frequency with which, under circumstances like those just mentioned, two ovules are developed in the place of one; thus, in the Green Rose, two ovules are always found on the open, foliaceous carpels, and a similar increase in number has recently been recorded by myself in *Ranunculus Ficaria.**

3. Not only may a branch be found occupying the position of an ovule, but sometimes also a flower-bud or an ovary. Thus in Crucifers it is not unusual to find a flower-bud or a silique actually in the ovary, in a line with the ovules. I have met with a similar instance in a grape, where a perfect berry was enclosed within the ordinary fruit, replacing one of the seeds. Something of the same kind may occasionally be met with in the Tomato.

It can hardly be said in these cases that the structure of the ovule is involved, as the change seems rather to consist in the substitution of flower-bud or seed-vessel for ovule, not in the permutation of the latter.

Such, in brief, were the main teratological changes which had been observed in the ovule when Professor A. Braun drew up a *résumé* of the subject in the appendix to his paper, "Ueber Polyembryonie und Keimung von Cœlobogyne," a French version of which is given in the 'Annales des Sciences Naturelles,' vol. xiv. anno 1860, pp. 13 *et seq.* Since Braun drew up his account, several cases of ovular malformation have been published, notably by Caspary, Baillon, Marchand, Fleischer, and others, to which I do not intend now further to refer, as they add

* Seemann's 'Journal of Botany,' 1867, p. 158.

little, save in points of detail, to what has been before said; but I wish specially to allude to the discovery of pollen within the tissues of the ovule, in a species of *Passiflora*, as recorded by my friend Mr. S. J. Salter, in the Linnean 'Transactions,' vol. xxiv. p. 143. Much interested at the time with the singularity of the occurrence, and the inferences to be drawn from it, I searched diligently for other examples of a like nature, but without success, till the present summer, when, on examining some flowers of *Rosa arvensis*, in which the stamens exhibited almost every conceivable gradation between their ordinary form and that of the carpels, I lighted upon some ovules which contained pollen, some in small quantities, others in greater abundance.

Speaking generally, the most common state of things in these flowers was the occurrence on the throat of the calyx, in the position ordinarily occupied by the stamens, and sometimes mingled with those organs, of twisted, ribbon-like filaments, bearing one or more pendulous, anatropous ovules about their centres and on their margins; immediately above the ovules were the anther lobes, more or less perfectly developed, and surmounting these a long style, terminating in a fringed, funnel-shaped stigma. Sometimes the ovules were perfect, at other times the nucleus protruded through the foramen, while in a third set of ovules the nucleus was included within the tegument, the ovules having in all respects their natural external conformation, but containing not only pollen-grains, but also a layer of those peculiar spheroidal cells, containing a fibrous deposit, which are among the normal constituents of the anther. In one case, where the coat of the ovule was imperfect, and thus allowed the nucleus to protrude, it was evident that the pollen was contained within the central mass of the ovule. In this instance I failed to see any of the fibrous cells, these I only found in cases where the coat of the ovule was perfect; and hence I am led to conclude, though I am far from being positive on this head, that the fibrous cells were part of the coat of the ovule, while the pollen was formed within the nucleus. I should also add that in no case did I find any trace of embryo sac within the ovule.

It would be a matter of the highest interest to trace the development of such structures as these; this was not practicable in this case, from the limited number of polliniferous ovules, and the fact that those that were present were all in about the same stage of development. The examination of these singular irregularities almost necessarily leads

to speculation on the relation of anthers to ovules, or rather between the mother-cells of the former and the embryo sac of the latter, between "germ-cells" and "sperm-cells,"—thus involving the very essence of sexual distinctions.

Wolf and Linnæus, and at a later period Goethe, inferred the intrinsic identity of the various parts of the flower from the fact that all alike were capable of assuming a leaf-like aspect. Organs morphologically dissimilar, on the other hand, cannot assume the same appearance, or, as Linnæus puts it, ('Prolepsis Plantarum,' sect. 10,) "the liver cannot become the heart, nor the heart the stomach." But, as it would obviously be unsafe to indulge in such speculations as these upon such slender premises, I would merely express a hope, now that attention has been drawn to the matter, that other more complete observations may be made. For similar reasons I forbear doing more than call attention to Mr. Salter's hint as to the significance of these polliniferous ovules in reference to the alleged cases of Parthenogenesis in plants,—a matter as it appears to me too hastily dismissed by the writer of the criticism in the 'Natural History Review' on Mr. Salter's paper.

EXPLANATION OF PLATE LXXII.

Fig. B 1–2. Two filaments, from the throat of the calyx of *Rosa arvensis*, bearing uncovered, pendulous, inverted, polliniferous ovules, above which are the true anther-lobes, and terminating in a style and stigma. B 3. Similar filament, bearing perfect ovules. B 4. Normal ovule. B 5–6. Portions of the ovules from 1 and 2, showing the fibrous cells—(5) top view; (6) side view. B 7. Pollen grains from the ovule. B 8. Imperfect ovule; the nucleus protruded through the foramen, and contained at its upper exposed portion a few pollen-grains. B 9. Diagrammatic view of an ovule seen under the compressorium, and showing both fibrous cells and pollen grains:—*all magnified*, Figs. 5, 6, 7, 200 diameters.

NOTICE OF AN ABNORMAL LEAF IN *PRUNUS LAUROCERASUS*.

BY ALEXANDER DICKSON, M.D.,
Professor of Botany in the University of Dublin.

(PLATE LXXII. C.)

The following brief notice refers to a specimen that I had the honour of exhibiting at the meeting of the British Association in Dundee last September. The specimen consisted of a portion of a shoot of *Prunus*

Laurocerasus, one of the leaves of which presented, in a marked manner, the phenomenon of fissiparous division. The petiole of the abnormal leaf did not exhibit any noteworthy peculiarity, and the ordinary scars left by the deciduous stipules on either side of its base were visible. The petiole, however, supported two laminæ, placed back to back, and united by their midribs* to within about an inch from their extremities, which were perfectly free from each other. These laminæ stood vertically, their edges being directed towards and away from the axis; and, as they were placed back to back, the shining surfaces, corresponding in structure to the normal upper-leaf surface, were directed laterally outwards. In the axil of this abnormal leaf were two axillary buds, placed side by side.

From the existence of two distinct leaf-apices, and of two axillary buds, it is evident that the condition here is not due to an accidental exuberance in the development of the leaf, but is produced by a true fissiparous division, which, had it been complete, would have resulted in the replacement of a single leaf by two leaves. It is worthy of remark that in the most common form of fissiparous division of a leaf, the two resulting portions stand in the plane of the primary lamina, as is seen in monstrosities where the extremity of a leaf is more or less deeply bifid, a branch of the forked midrib entering each of the resulting lobes. In the monstrosity under consideration, however, the two laminæ are placed at right angles to what would have been the plane of the primary lamina. The diagrams on Plate LXXII. will help to render this intelligible.

Whether or not there may be an analogy between this monstrosity in *Prunus Laurocerasus* and the four-winged filaments in certain double flowers described by Dr. Masters (Report of Proceed. of Internat. Bot. Congr., London, 1866), I am scarcely prepared to say; but, so far as I can judge, the condition described by Dr. Masters appears to be rather an exuberance of growth than a distinct fission. It is possible, however, that we have a *normal* counterpart to the above-described monstrosity in cases where a staminal filament is forked in such a manner that the anthers borne by the branches are placed back to back, *i. e.* facing laterally outwards, as in *Adoxa*, *Betula*, *Carpinus*,

* It would, of course, be more correct to say "not separated at their midribs;" but it is evident that the incorrect expression is better adapted for descriptive purposes.

and *Ostrya*; but the employment of all such comparisons, it need hardly be said, requires the greatest caution.

EXPLANATION OF PLATE LXXII.

Fig. C 1 represents the normal arrangement of axis (a), leaf, and axillary bud (a').
Fig. C 2 represents the condition in the monstrosity in *P. Laurocerasus* described in the text, $a'\,a'$ = the two axillary buds.
Fig. C 3 represents the more common mode of fission of a leaf, where the resulting laminæ lie in the plane of the primary lamina. The converging dotted lines indicate the greater or less coalescence below of the two halves of the fissiparously divided leaf.

A FEW NOTES ON SOME BRITISH MOSSES ALLIED TO *TORTULA FALLAX*, *Hedwig*.

BY WILLIAM MITTEN, ESQ., A.L.S.

Having recently gathered fruiting specimens of *Tortula vinealis*, β, 'Bryologia Europæa,' in North Wales, my attention has been recalled to the very considerable differences existing between it and the typical form so common in Sussex, on walls, and also to the confusion which appears to me to exist among some other closely allied Mosses.

The group of species of which *Tortula fallax* may be taken as the representative—it being the oldest described species—includes a number of Mosses found almost exclusively in the temperate and cooler regions of the earth; they appear to be generally distributed in Europe, and are continued from the Mediterranean region and northern Africa into northern India; a few peculiar species are found in the higher regions of the Himalaya; in America the preponderance of species appears to be on the western side of the Continent; a few, common also to Europe, occur in British North America, but it is remarkable that only one species is enumerated by Sullivant as found in the United States.

All the Mosses referable to this group are conspicuous from their tendency to become of a deep or rusty-brown colour, only the younger leaves being green; in their habit, in the structure of their leaves, inflorescence, and fructification, there is the closest resemblance amongst the species; the peristome is in some shorter than in *T. fallax*, but is precisely of the same structure, and differs only in its length and twisting; in two exotic species it is absent.

In Britain these Mosses are, for the most part, called *Tortulas*, but

elsewhere they are found in Bryological works, generally under the synonymous name of *Barbula*, which latter designation they may probably eventually retain when the present chaotic state of the extensive family, of which they form a part, shall have been reduced to order on some more natural plan; a few species have been placed in *Trichostomum* and *Didymodon*, from the importance which has been placed in the length of the peristomial teeth.

For convenience they may be divided into two sections, the first including those species which have their leaves without any erect base, and the second comprising those which have an erect base appressed to the stem. In the first section may be placed *Tortula fallax*, Hedw. Musc. Frond. i. t. 24, which varies considerably in size and in the length of its leaves, and also in the length of its capsule, operculum, and peristome; it is reputed to be a generally common species; in herbaria it is frequently confounded with *T. unguiculata*, Hedw., which, although of the same size, belongs to a different group.

T. vinealis (*Barbula*), Bridel, Bryol. Univ. i. p. 830; Bruch. et Schimp. Bryol. Europ. Barbula, t. 10, so far as relates to the form *a*, is distinguished from *T. fallax* by its more tufted mode of growth, its strictly patent leaves with a stouter nerve, which, towards the apex of the acute point, is obscure, and not distinguishable from the lamina of the leaf; the apex itself is usually tipped with a pointed hyaline cell; when dry, the foliage is appressed, not crisped or contorted; the capsule is not so cylindrical, and comes to maturity in May, when that of *T. fallax*, ripe in midwinter, has long passed by. This species is common in Sussex and Surrey, on walls, especially by roadsides; it appears to prefer dry situations. *T. gracilis*, Schl., is much more nearly allied to *T. vinealis* than it is to *T. fallax*, but it has yet to make good its claim to be considered a British species.

T. recurvifolia, Wils.,—formerly distributed by Mr. Wilson as *Grimmia* or *Schistidium recurvifolia*, Wils. ms.; *Tortula fallax*, δ. *recurvifolia*, Wils. Bryol. Brit. p. 124; *Barbula recurvifolia*, Schimper, Coroll. et Synops. p. 170,—is, as usually seen in British specimens, a more slender Moss than *T. fallax*, and has its leaves arranged in a tristichous manner, recurved and hooked, both surfaces as well as the back of the nerve, which vanishes below the apex, very rough with papillæ; when dry, the foliage is appressed and incurved. Of this very distinct Moss I have seen no fertile specimens; it occurs in Scot-

land, Yorkshire, and Derbyshire; it was gathered in the Pyrenees by Mr. Spruce, and I have a specimen from Arnold marked *Trichostomum rubellum*, β.

M. Schimper, who makes no mention of this species having been previously known in Britain, describes it as more robust than *T. fallax*, and says nothing about its trifarious leaves,—a character which may, however, on the fertile plant, be less obvious than it is on the more slender shoots; he describes the fruit as similar to that of *T. fallax*.

T. gigantea = *Grimmia gigantea*, Schimp. Synops. p. 695; "*Trichostomum giganteum*, Funk; *Barbula robusta*, Al. Braun; *Dicranum speciosum*, Sauter," according to a label written by Arnold; *Barbula recurvifolia*, Mitten, Musc. Ind. Or. in Journ. of the Linn. Soc. 1859, p. 34; *Tortula vinealis*, var. *nivalis*, Spruce, Musc. Pyren. n. 185,—is a far more robust species than the preceding, but has its foliage, when wet, recurved in the same manner, the cells of the upper part of its leaves many-angled with wide interstices; it has been found in Ireland by Mr. D. Moore. No fruit of this fine Moss has yet been seen, but its affinity is greater to *T. recurvifolia* than to any species of *Grimmia*.

T. spadicea, n. sp., is in habit similar to *T. fallax*, but usually more robust and taller, from one to two inches high; its leaves are patent from the very base, when dry they are incurved and closely imbricated, lanceolate-subulate, canaliculate; the margin recurved below; the nerve percurrent and distinct from the lamina to the apex of the leaf; cells everywhere rounded, subobscure; the perichætial leaves with their lower half erect, broadly ovate, the upper narrow and recurved; the seta is red, the capsule erect, cylindrical, with a shortly subulate, slightly twisted operculum; the peristome short; the teeth narrow, almost smooth, seated on a very short membrane. It is *Trichostomum rigidulum*, α, Bryol. Europ. *Trichostomum*, t. 7; Schimper, Synops. p. 148; Wils. Bryol. Brit. p. 114; and Musci Exsicc. n. 109; it is also *T. rigidulum*, Funk, Crypt. Fichtelgebirgs, 612.

The habitat of this Moss is stated to be on rocks and stones near water.—Scotland, Drummond. Yorkshire, near Bolton Abbey, Mr. Wilson. Ireland, Miss Hutchins.

This species, which in the 'Bryologia Europæa' is beautifully figured as the typical state of Hedwig's *Didymodon rigidulus*, differs from that Moss in many important particulars: its leaves have no erect base, with no elongated pellucid cells, and the nerve has no ap-

pearance of being excurrent; the peristome is too short to show any trace of twisting, but its structure is exactly that of *T. fallax* and *T. vinealis*.

T. lurida (*Didymodon*), Hornschuch, is another species, which is very well distinguished from any of the preceding by its patent, shorter or wider leaves, excepting in the length of its peristome, which does not differ in structure. It agrees so closely with them that it must be considered a member of the same family.

The second section, containing those species which have an erect base to their leaves, includes:—

T. rigidula (*Didymodon*), Hedw. Musc. Frond. iii. p. 8, t. 4, which he describes as "erecta, foliis lanceolatis, e vasorum fasciculo cuspidatis, rigidulis, operculo subulato curvulo;" and in his 'Historia Analytica,' he continues, "Folia lanceolata, carinata, margine sæpe reflexo, fasciculo ductulorum valido, unico cuspidem extremam constituente." His figure represents the leaf of a lanceolate outline with an erect base, from whence the upper portion is patent.

This is *Didymodon rigidulus* of Hooker and Taylor, Muscol. Brit. t. 20, and of 'English Flora,' vol. v. p. 29; and it is *Trichostomum rigidulum*, *β. densum*, Bryol. Europ. Trichostomum, t. 7, and Schimp. Synops. p. 149, also of Wilson, Bryol. Brit. p. 114. Its habitat appears to be usually on walls; it is probably generally distributed in Britain; my specimens are from Scotland, Yorkshire, Sussex, and Cornwall. In the 'Bryologia Europæa' this Moss has scarcely been represented, the plate, in which it is delineated of the natural size, being occupied by the species here described as *T. spadicea*, but from this it is easily distinguished by its stiffer foliage, which is not appressed and imbricated when dry, but "bristly," as stated in Eng. Flora, the leaves being slightly curved and loosely contorted, the erect base has many oblong, pellucid cells, and the stout nerve is continued with the lamina of the leaf into a thick, obscure point, which does, at first sight, appear as if the nerve was excurrent, as stated by Hedwig.

It is not very obvious on what principle this species, which in the length of its peristome exceeds in development *T. spadicea*, should have been reduced to the subordinate position of a variety of that Moss.

T. sinuosa (*Dicranella*, Wils. mss.) has its long lanceolate lineal or subulate leaves patent from a very short pellucid base, in which the cells are all oblong and rectangular, and the margin erect, the upper

portion is carinate, the margin slightly recurved below, above it is remotely and irregularly denticulate, the nerve is continued into a thickened, obscure, blunt point, which has so great a tendency to break off that in some specimens it is not easy to find a perfect leaf; when dry, the foliage is twisted and contorted; its fruit has not yet been found.

In Sussex this Moss grows about the roots of trees in shady places, at base of the chalky hills. Mr. Borrer gathered it in Cornwall, and Mr. Wilson near Bangor.

T. insulana, De Notaris, Syllabus Musc. Ital. p. 180; "laxe cæspitosa; caule erecto elongato a basi ramoso; foliis confertis patentissimis obliquis, e basi appresse lanceolatis, lineari-subulatis, acutissimis, marginibus inferne recurvis, cæterum planis, integris, nervo excurrente donatis, siccitate valde contortis; capsula tereti oblonga erecta, operculo conico-attenuato, obtusiusculo, capsulam dimidiam longitudine æquante; peristomii dentibus ima basi connatis."—*Barbula vinealis, β. flaccida*, Bryol. Europ. Barbula, t. 10; Schimper, Synops. p. 171. *Tortula vinealis*, Wils. Bry. Brit. p. 124. t. 42, Musci Exsicc. 121. De Notaris, Musc. Ital. p. 60. t. 30. *Zygotuchia cylindrica*, Taylor in Mackay Flor. Hibern. (*fide* Spruce). This Moss appears to be not uncommon in England, rarely occurring in fructification; it is found, also, in the south of Ireland, but I have seen no specimens from Scotland.

First characterized as a distinct species by De Notaris in 1838, in the description above given, it has since by himself,—probably in deference to the authors of the 'Bryologia Europæa,'—been redescribed and figured in 1862 as *T. vinealis*, Brid., but from this it differs in the long, narrow leaves spreading in all directions, recurved or uncinate, from an erect base, which is appressed to the stem and has erect margins; in a dry state the foliage is cirrhate.

There is another British Moss which, although not referable to the particular group now considered, is very frequently represented in Herbaria by *T. insulana*, it is the *Anœctangium Hornschuchianum* of Taylor in Fl. Hibernica; the only specimens of which that I have seen are those given me by the late Dr. Taylor himself; as this species is perfectly distinct from *Anœctangium Hornschuchianum* (*Gymnostomum*), Hoppe et Hornsch., and although more nearly resembling *Didymodon cylindricus*, B. et S., is certainly a different species, I propose that it should be called—

Tortula Hibernica; stems elongated, branched, the leaves loosely inserted, at the apices of the stems subcomose and stellate, having an erect base, which is dilated and clasping above, from thence they are patent or patenti-divergent, straight, rarely incurved or recurved, channelled, when dry, cirrhate; in outline they are ovate-lanceolate below, thence lineal-subulate and acute, the yellow nerve is continued to the apex, it is quite smooth on the bark, the margin is everywhere erect, quite entire in the dilated lower portion, where it is undulated, and in the upper only crenulate from the slight protuberance of the cells, these last, in the lower portion of the base, are elongated, rectangulate, and pellucid, quickly above changing into those which are minute, rounded, and obscure, on both surfaces of the leaf they are nearly smooth.

"Mountains near Dunkerron, common, but always sterile."—*Dr. Taylor*.

Stems about two inches high. Foliage brownish-yellow.

Anœctangium Hornschuchianum differs from the Irish Moss in its densely inserted leaves, which have the pellucid cells of their dilated base continued up into the narrowed patent portion, and thence gradually passing into rounded obscure ones, the whole upper portion of the leaf is narrower and more gradually narrowed to the point, the margin of the upper part of the dilated base is always more or less distinctly crenate or serrulate, from thence to the apex it is entire, and the foliage is altogether more soft. *Didymodon cylindricus* has the base of its leaves but very little wider than the upper portion, and this last more flattened, not convex on the back, and the whole substance less firm and persistent.

Hurstpierpoint, October 10, 1867.

ON SOME PLANTS (ESPECIALLY LICHENS) COLLECTED DURING THE SUMMER OF 1863, IN NORWAY AND LAPLAND.

By Isaac Carroll, Esq.

The route followed, in a rapid though somewhat extensive journey, was from Christiania to the head of the Romsdal, and so on to Trondhjem, thence by steamer to Alten, where we took ponies, and

crossed Lapland to Haparanda, on the Gulf of Bothnia. Independently of our being pressed for time, a great part of the country traversed was low and swampy, with a monotonous vegetation.

I have only enumerated the more interesting Phaenogams, but have given the list of Lichens *entire*, in order to compare with Dr. Lindsay's "Contributions to the Lichen-flora of Northern Europe," published in the Journal of Linnean Society, nos. 38 and 39, 1866–1867. In this paper Dr. Lindsay observes, "The British Lichen-flora is considerably poorer than that of the Scandinavian peninsula." But Dr. Lindsay relies on a comparison between Mudd's 'Manual' and Nylander's 'Lichenes Scandinaviae,'—works of very unequal merit, as he, however, observes. My experience leads me to a different conclusion. Since Mudd published, at least 100 new British Lichens have been found by Admiral Jones and myself alone, without taking into account what Mr. Mudd himself, Mr. Leighton, and others may have been doing. And whereas there is, as I have already observed, a good deal of uniformity in the Lichen-flora of Scandinavia, especially in the northern regions, there is a very great variety to be found in the different provinces of Great Britain and Ireland, and further researches will probably add largely to the number of species already known. I am of opinion, that if the Lichen-flora of the British Islands were properly studied, we should number as many forms as can be found in Scandinavia.

Ranunculus glacialis, L.—Mountain over Nystuen, Romsdal, very sparingly.

R. nivalis, L.—In Tromsdal, and on the mountains over Kaafjord, plentiful at the snow line.

R. pygmaeus, Wahl.—Tromsdal.

R. reptans, L.—Low grounds about Bosekop and Kautokeino. This is like a very much reduced form of *R. Flammula*, L., with filiform leaves, and stems prostrate and sometimes rooting at the joints.

Aconitum Lycoctonum, L., var. *septentrionale*, Willd.—Gudbrandsdal, plentiful.

Arabis hirsuta, Br.—Kaafjord, almost in 70° N. Bentham says of this plant, "not in high northern latitudes," but Wahlenberg includes it in his 'Flora Lapponica' as occurring rarely in southern Nordland.

A. alpina, L.—High mountains, Tromsdal.

Cardamine bellidifolia, L.—Tromsdal.

Cochlearia officinalis, L., var. *arctica*, Schl.—Tromsdal. Exactly the same plant as what I found in 1864 on Ben Lawers.

Draba alpina, L.—Dovrefjeld, Dr. Moore.

D. nivalis, Liljebl.=*D. muricella*, Wahl. Dovrefjeld, Dr. Moore.

(In the Lapland barley-fields, as by Suvajarvi Lake, I observed *Galeopsis versicolor*, Curt., and *Thlaspi arvense*, L., to be the commonest weeds. *Galeopsis Tetrahit*, L., *Erysimum cheiranthoides*, L., and a *Brassica* also occurred.)

Lychnis alpina, L.—Lapland.

Stellaria uliginosa, Murr.—Suvajarvi Lake, Lapland. Bentham says, "not an Arctic plant," but Wahlenberg includes it in 'Flora Lapponica.'

Phaca frigida, L.—In a thicket about ten English miles north of Kautokeino.

Oxytropis Lapponica, Gaud. Dovrefjeld, Dr. Moore.

Lathyrus palustris, L.—Island in the Torneå, near Matarengi. Found in Lapland by Linnæus, but not by Wahlenberg.

Rubus arcticus, L.—Alten valley, and at the Swedish side as far south as Ouska.

R. arcticus, L., var. *flore pleno*.—By the lake at Suvajarvi. Flower deeper-coloured than usual and fragrant, resembling a small crimson Rose.

Rosa cinnamomea, Willd.—By the Muionio river, and between Matarengi and Haparanda.

R. alpina, L.—Near the Falls of the Nid, Trondhjem.

Circæa alpina, L.—Norway, and I think I also saw it in the Alten valley. It is rare in Lapland.

Sedum annuum, L.—Bodö.

Saxifraga oppositifolia, L.—Tromsdal, at the snow line.

S. cæspitosa, L.—Mountain over Kaafjord, at an elevation of at least 3000 feet.

S. cernua, L.—Tromsdal.

S. rivularis, L.—Tromsdal.

S. adscendens, Wulf.—Qvam, Norway.

S. Cotyledon, L.—Ormen, Romsdal.

Hypochæris maculata, L.—Barley-field at Qvam, Norway.

Hieracium Sabinum, Vill.—Barley-field at Qvam, Norway.

H. alpinum, L.—Lapland, frequent; varying much in size.

H. pallidum, Biv.—Bodö.

H. cæsium, Fr.—Christiansand.

H. Lapponicum, Fr.—Matarengi.

H. tridentatum, Fr.—Muionvara.

H. rigidum, Fr.—Haparanda.

H. umbellatum, L.—Haparanda.

Sonchus alpinus, L.—Wood near Trondhjem.

S. Sibiricus, L.—Cornfield near Haparanda.

Andromeda hypnoides, L.—Mountain over Nystuen, Romsdal, very sparingly.

A. tetragona, L.—High mountain over Kaafjord; plentiful.

Rhododendron Lapponicum, Wahl.—Mountain over Nystuen, Romsdal.

Menziesia cærulea, Sm.—Nystuen.

The *Menziesia* was flowering plentifully just outside the windows of the little "gaard," or farmhouse, where we lodged.

Ledum palustre, L.—At Bosekop, and plentifully in the interior of Lapland.

Pyrola uniflora, L.—Romsdal. Flowers fragrant, smelling like those of *Neottia gemmipara*, Sm.

Gentiana nivalis, L.—Meadows by the Alten river.

Polemonium cæruleum, L., var. *campanulatum*, Fr.—Meadows about Kautokeino.

Diapensia Lapponica, L.—Mountain over Nystuen, and at the head of the Alten valley.

(In the Norwegian cornfields one often sees *Asperugo procumbens*, L., *Androsace septentrionalis*, L., *Potentilla stricta*, L., *Carduus crispus*, L., and *Anchusa officinalis*, L. This last is a beautiful plant.)

Veronica longifolia, L.—Head of the Alten valley.

Pedicularis Sceptrum-Carolinum, L. Near Kautokeino, and by the Muonio river.

P. Lapponica, L.—Mountain over Nystuen, and plentiful on the bare fjelds in Lapland.

P. flammea, L.—Mountain over Nystuen, Romsdal.

P. hirsuta, L.—Over Kaafjord.

Betula alpestris, Fr.—Between Kautokeino and Karesnando.

Salix sarmentacea, Fr.—By a small lake in the heart of Lapland. Quoted under *S. retusa*, L., by Nyman, but it looks quite different.

S. glauca, L.—Norway and Lapland, frequent. The typical *glauca* is very well marked, but the vars. of this and the following are very puzzling.

S. Lapponum, L.—Frequent.

S. myrtilloides, L.—My specimens are marked "Finmark," and were probably collected near Bosekop. Fr. says, "*In Finmarkia rarissima.*"

S. depressa, L. (*fide* Th., M., Fr.)—Kautokeino. This *Salix* appears to be very near *S. phylicifolia*, L.

Juncus Bottnicus, Wahl.—Shore near Haparanda.

J. alpinus, Vill.—Bodö.

Luzula Wahlenbergii, Rupr.—Over Kaafjord, and near Kautokeino.

L. hyperborea, Br.—Fjelds, Lapland. Very near *L. arcuata*, Hook.

Scheuchzeria palustris, L.—Bog near Haparanda.

Eriophorum alpinum, L.—Tromsdal, and near Haparanda.

Carex lagopina, Wahl.—Tromsdal.

C. festiva, Desv.—Tromsdal.

C. loliacea, L.—Tromsdal.

C. rotundata, Wahl.—Bog near Haparanda.

C. panicea, L., *β. sparsiflora*, Wahl.—Finmark.

C. ustulata, Wahl.—Dovrefjeld, Dr. Moore.

C. globularis, L.—Swamps, Muionvara.

C. alpina, Sw.—Tromsdal and Alten valley.

C. Buxbaumii, Wahl.—Tromsdal.

C. juncella, Fr.—Lapland.

C. pulla, Good.—Suvajarvi, Lapland.

C. pauciflora, Lightf.—Near Trondhjem.

Calamagrostis Lapponica, Wahl.—Throughout Lapland, frequent.

C. neglecta, Ehrh.—Bodö, Norway; Kautokeino and Muionvara, Lapland.

Trisetum subspicatum, Beauv.—Tromsdal.

Woodsia glabella, Br.—Wet rocks, Gargia station, Alten valley. In habit and colour very like *Asplenium viride*, for a form of which I at first mistook it. Only lately added to the European flora. *W. hyperborea*, Br. (or a small form of *W. Ilvensis*, Br.), is frequent in Lapland.

Weissia crispula, Hedw.—Romsdal, Norway.

Dicranum polycarpum, Ehrh.—Qvam, etc., Norway.

D. polycarpum, *β. strumiferum*, Web. et Mohr.—Lapland.

D. virens, Hedw.—Norway and Lapland.

D. subulatum, Hedw.—Bosekop, Finmark.

D. longifolium, Hedw.—Frederikstad, Sweden.

D. Schraderi, Schwægr.—Swamps, Muionvara.

D. elongatum, Schwægr., var. *striatum* (Th., Fr.).—Alten valley.

D. crispum, Hedw.—Pello.

Encalypta ciliata, Hedw.—Norway and Lapland.

Grimmia ovata, Web. et Mohr.—South of Norway.

Racomitrium microcarpon, Brid.—Swedish Lapland.

Orthotrichum rupestre, Schleich. Christiansund.

O. speciosum, Nees.—On trees near the falls of the Glommen, plentiful.

O. curvifolium, Hedw.—Near the Glommen.

Zygodon Mougeotii, Br. et Sch.—Alten valley.

Tetraphis pellucida, Hedw.—Lapland.

Polytrichum sexangulare, Hoppe.—Lapland, sterile.

P. formosum, Hedw.—Suvajarvi Lake, Lapland.

P. juniperinum, Hedw., *β. strictum* (Menz.) et *γ. alpestre* (Hoppe) —Lapland, frequent.

Aulacomnion turgidum, Wahl.—Dovrefjeld, Dr. Moore.

Leptobryum pyriforme (Hedw.), Wils.—Bogs, Lapland, common. It is strange that this plant, so frequent in Arctic swamps, should in Britain be oftener found in stoves and conservatories (where it grows spontaneously upon the mould in garden pots) than in any other habitat.

Bryum Ludwigii, Sprengl.—Avasaxa, Lapland.

B. pseudo-triquetrum, Schwægr.—Qvam, Norway, and Alten valley.

B. pallescens, Schwægr.—South of Norway.

B. Zierii, Dicks. Alten valley, and Muionvara, Lapland.

Mnium cinclidioides, Hüb.—Alten valley and Skellefteå, Swedish Lapland.

Paludella squarrosa, Brid.—Tromsdal, Norway, and Muionvara, Lapland.

Meesia uliginosa, Hedw.—Lapland, common.

Funaria hygrometrica, Hedw.—Kautokeino. "*Per Lapponiam rarissime*," Wahl.

Bartramia ithyphylla, Brid., var.—Alten valley.

Conostomum boreale, Sw.—Kautokeino, fertile.

Splachnum luteum, L.—Between Kautokeino and Suvajarvi, and at Muionvara. This beautiful plant, when growing, is like a small golden-yellow Agaric.

S. vasculosum, Hedw.—Muionvara.

Tayloria serrata, Br. et Sch.—Between Kautokeino and Suvajarvi. This plant is not mentioned by either Wahlenberg or Sommerfelt.

Leskea polyantha, Hedw.—Wall of Torneå churchyard.

Hypnum reflexum, Starke.

H. strigosum, Hffm.—Qvam, Norway.

H. trifarium, Web. et Mohr.—Muionvara, plentiful.

H. stramineum, Dicks.

H. abietinum (Dill.), L.—Qvam, Norway.

H. fluitans (Dill.), L.—Lapland.

H. revolvens, Sw.—Tromsdal.

H. aduncum (Dill.), L.

H. Kneiffii, Schimp.—Avasaxa, Lapland.

H. rugosum (Dill.), Hedw.—Qvam.

H. commutatum, Hedw., *β. condensatum*, Wils.—Bodö, Norway.

H. uncinatum (Hall.), Hedw.—Muionvara.

H. Crista-castrensis, L.—Frederikstad, Sweden.

H. pratense, Koch.—Kautokeino.

(I collected many *Jungermanniæ;* but such as could be determined belonged to our usual British species; *J. ciliaris* and *J. setiformis* were the most striking.)

Collema flaccidum, Ach.—On rocks, Qvam, Gudbranddal, Norway.

Leptogium saturninum (Dicks.), Nyl.—On trunks of trees, Haparanda.

Calicium quercinum, Pers.; var. *lenticulare* (Ach.), Nyl.—On *Pinus sylvestris*, Avasaxa, Lapland.

Sphærophoron coralloides, Pers.

Bæomyces icmadophilus (Ehrh.), Nyl.—Mountain over Nystuen, Romsdal, Norway.

Cladonia pyxidata (L.), Fr.; var. *pocillum* (Ach.), Nyl.—Lapland.

C. gracilis, Hffm.; f. *elongata*, Ach.—Mountain over Nystuen.

C. cornuta (L.), Fr.—Matarengi, Lapland.

C. carneola, Fr.—Muionvara, Lapland.

C. botrytes (Hag.), Hffm.—Lapland.

C. furcata, Hffm.; f. *recurva*, Hffm., *frondosa*, Del.—Lapland.
C. rangiferina, Hffm.
C. uncialis, Hffm.
C. amaurocræa (Flk.), Nyl.—Nystuen, Muionvara, and Matarengi.
C. cornucopioides (L.), Fr.—Kautokeino, Matarengi; very fine.
C. bellidiflora (Ach.), Schær.—Kautokeino.
C. deformis (L.), Hffm.—Matarengi.
Stereocaulon paschale, Laur., and var. *subcoralloides*, Nyl.
S. denudatum, Flk.—Christiansand and Trondhjem.
Thamnolia vermicularis (L.), Ach.—Mountain over Nystuen.
Usnea barbata, Fr.; var. *hirta*, Fr.
U. barbata, var. *dasypoga* (Ach.), Fr.—Avasaxa.
Alectoria divergens (Ach.), Nyl.—Mountain over Nystuen.
A. nigricans (Ach.), Nyl.—Mountain over Nystuen.
A. jubata (L.), Ach.
A. ochroleuca (Ehrh.), Nyl.
Evernia furfuracea, Mann.—(Error as to *habitat.*)
E. prunastri (L.), Ach.—Skelefteå, Swedish Lapland.
Ramalina polymorpha, Ach.; var. *capitata*, Ach.—Mountain over Nystuen.
Cetraria Islandica (L.), Ach.; var. *crispa*, Ach.
C. Delisei, Schær.—Matarengi.
Platysma nivale (L.), Nyl.
P. cucullatum, Hffm.
P. triste (Web.), Nyl.
P. sæpincola, Hffm.—Qvam.
P. ulophyllum (Ach.), Nyl.—Sarpsborg.
P. Fahlunense (L.), Nyl.
P. juniperinum (L.), Nyl.
P. pinastri (Scop.), Nyl.
P. glaucum (L.), Nyl.
Nephroma arcticum (L.), Fr.—South of Norway, and in Lapland. Apothecia at Qvam (Dr. Moore), and Avasaxa.
Nephromium tomentosum (Hffm.), Nyl.
N. lævigatum (Ach.), Nyl., var. *parile* (Ach.).
Peltigera aphthosa, Hffm.
P. malacea, Fr.—Avasaxa.
P. canina, Hffm.

P. spuria (Ach.), DC.

P. polydactyla, Hffm.

P. venosa, Hffm.

Solorina crocea (L.), Nyl.

S. saccata (L.), Ach.

Stictina sylvatica (L.), Nyl.

S. scrobiculata (Scop.), Nyl.

Parmelia saxatilis (L.), Ach.; var. *omphalodes* (L.), Fr.; var. *panniformis* (Ach.), Schær.—Nystuen, Alten; var. *sulcata* (Tayl.), Nyl.—Qvam.

P. conspersa, Ach.—South of Norway.

P. centrifuga (L.), Ach.—Kaafjord, Kautokeino, etc.

P. incurva (Pers.), Fr.—Lapland.

P. olivacea (L.), Ach.—Qvam, Muionvara.

P. exasperata (Ach.), D. N.—Trondhjem, Alten valley.

P. prolixa (Ach.), Nyl.—Trondhjem.

P. alpicola, Th., Fr.—Trondhjem.

P. stygia (L.), Ach.—Qvam, Matarengi, etc.

P. lanata (L.), Nyl.

P. physodes (L.), Ach.; var. *vittata*, Ach.; var. *obscurata*, Ach.

P. ambigua (Wulf.), Ach.—Alten valley.

P. aleurites, Ach. = *P. hyperopta*, Ach.—Alten, Avasaxa.

Physcia parietina (L.), D. N.; var. *ectanea*, Ach.—Qvam. Var. *polycarpa* (Ehrh.), Nyl.—Haparanda. Var. *lobulata* (Flk.), Nyl.

P. lychnea (Ach.), Nyl.—Haparanda.

P. ciliaris (L.), De Cand.

P. pulverulenta (Schreb.), Fr.; f. Sarpsborg.

P. stellaris (L.), Fr.

P. cæsia (Hffm.), Nyl.

P. obscura (Ehrh.), Fr. Var. *ulothrix* (Ach.), Fr.—Trondhjem. Var. *lithotea*, Ach.—Qvam.

Umbilicaria pustulata, Hffm.—With apothecia at Sarpsborg (Falls of the Glommen), Norway.

U. spodochroa, Hffm.—Norway and Lapland, frequent.

U. proboscidea, De Cand.

U. cylindrica (L.), Dub.

U. erosa, Hffm.

U. hyperborea, Hffm.

U. polyphylla (L.), Schrad.

Psoroma hypnorum (Hffm.), Fr.—Dovrefjeld, Dr. Moore.

[*Pannaria Hookerii* (Sm.), Nyl.—Mountain over Andafjord, North Faröe Islands.]

P. brunnea (Sw.), Mass.

P. microphylla (Sw.), Mass.—Kautokeino.

P. nigra (Huds.), Nyl.—Kautokeino.

Arctomia delicatula, Th., Fr.—Mountain over Kaafjord.

Amphiloma lanuginosa (Fr.), Nyl.

Squamaria chrysoleuca (Sm.), Nyl.
S. melanophthalma (Ram.), De Cand.—On a large boulder, Holaker, Norway.

S. saxicola (Poll.), Nyl.—Qvam.

S. geophila, Th., Fr.—Alten valley.

S. gelida (L.), Nyl.

Placodium elegans, De Cand.—Qvam, Kautokeino, etc.

Lecanora vitellina, Ach.—Torneå.

L. aurantiaca (Lightf.), Nyl.

L. ferruginea (Huds.), Nyl.; var. *festiva*, Ach.—Trondhjem. *F. muscicola.*—Alten valley.

L. cerina (Ehrh.), Ach.

L. pyracea (Ach.).—Sarpsborg, Haparanda.

L. holocarpa (Ehrh.).—Torneå.

L. calva (Dicks.).—Alten valley.

L. nimbosa, Fr.—Alten valley.

L. sophodes, Ach. Var. *confragosa*, Ach.—Qvam. Var. *heterospora*, Carr.—Dovrefjeld, Dr. Moore. This form is remarkable for having some *asci* containing simple, round or oval spores, along with others filled with spores of the usual form, all in the same apothecium.

L. turfacea (Wahl.), Ach.; var. *biatorina*, Nyl.—Kaafjord.

L. cinerea (L.), Smmrf.; f. *obscurata*, Fr., *lecideina*; f. *voluta*, Ach.

L. oculata (Dicks.), Ach.—Matarengi.

L. parella (L.), Ach.

L. tartarea (L.), Ach.; var. *gonatodes*, Ach.—Kaafjord.

L. aipospila (Wahl.), Ach. = *L. maritima*, Smmrf.—Bodö, Norway.

L. subfusca, Ach.; var. *atrynea*, Ach.; var. *coilocarpa*, Ach.

L. umbrina, Ach.—Sarpsborg.

L. varia, Ach.; var. *intricata*, Ach.; var. *illusoria*, Ach.; var. *hypopta* (Ach.), Nyl.—On Pines, Avasaxa.

L. argopholis (Wahl.), Ach.—Qvam.

L. rhypariza, Nyl., L. S.; var. *castanea*, Hepp. Fl. Eur. 270.—Qvam.

L. badia, Ach.

L. atra, Ach.

L. ventosa, Ach.

L. chlorophana (Wahl.), Ach.—Bodö.

L. cervina (Pers.), Ach.

L. fuscata (Schrad.), Nyl.; f. *smaragdula*, Wahl.; f. *Sinopica*, Sm.

Urceolaria scruposa, Ach.

Pertusaria bryontha (Ach.), Nyl.—Mountain over Nystuen.

P. dactylina (Ach.), Nyl.; *Isidium*, Ach.—Mountain over Nystuen.

P. melastoma, Nyl.—Mountain over Nystuen.

Lecidea carneo-pallida, Nyl.—Laprand.

L. decolorans, Flk.; var. *desertorum*, Ach.—Alten valley.

L. atro-rufa, Ach.—Alten valley.

L. fusco-rubens, Nyl.—Trondhjem.

L. vernalis, Ach.—Mountain over Kaafjord.

L. turgidula, Fr.—Sarpsborg, Norway.

L. sabuletorum, Flk.

L. cyrtella, Ach.—Haparanda.

L. dubitans, Nyl.—Qvam.

L. adpressa, Hepp. Fl. Eur. 277. = *L. gyaliza*, Nyl. L. S.—Alten valley.

L. pelidna, Ach. = *L. umbrina* (Ach.), Nyl., L. S. = *Scoliciosporum holomelanum et compactum*, Krb.

L. bacillifera, Nyl.; f. *subincompta*, Nyl.—Norway (Dr. Moore).

L. pezizoidea, Ach.—Alten valley.

L. fuscescens, Smmrf.—Lapland.

L. improvisa, Nyl.—Skelefteâ.

L. parasema, Ach.; f. *muscicola*—Kaafjord. Var. *enteroleuca*, Ach.—Qvam, etc. Var. *latypea*, Ach.—Trondhjem.

L. Dovrensis, Nyl.—Mountain over Nystuen.

L. limosa, Ach.—Dovrefjeld (Dr. Moore).

L. alpestris, Smmrf.—Arctic Norway (Fr. Carroll).

L. cuprea, Smmrf.—Arctic Norway (Fr. Carroll).

L. rivulosa, Ach.

L. contigua, Fr.; var. *meiaspora*, Nyl.

L. confluens, Ach.; f. *calcarea*, Ach.—Trondhjem.

L. lapicida, Fr.; var. *declinans*, Nyl., et var. *ochromela*, Ach.

L. lithophila, Ach.—Kautokeino.
L. theiodes, Smmrf.—Lapland. [Thorshavn, Faröe Islands.]
L. fusco-atra, Ach.; var. *fumosa*, Ach.—Trondhjem.
L. tenebrosa, Flot.—South of Norway.
L. lugubris, Smmrf.
L. coracina, Ach.—Kaafjord.
L. atro-alba, Flot.
L. badio-atra, Flot.—Trondhjem.
L. petræa, Flot.
L. geminata, Flot.—Qvam.
L. disciformis, Fr.
L. myriocarpa (De Cand.), Nyl.—Torneå.
L. abietina, Ach.—Lapland.
L. ostreata (Hffm.), Schær.—Muionvara.
L. melancheima, Tuck.=*L. euphoroides*, Nyl.—Avasaxa.
L. sanguinaria, Ach.
L. galbula (Ram.), Nyl.—Mountain over Nystuen.
L. alpicola (Schær.), Nyl.—Kaafjord.
L. geographica (L.), Schær.; f. *gerontica*, Ach.—Kaafjord.
Xylographa parallela, Fr.—South of Norway.
Graphis scripta, Ach.
Opegrapha varia, Pers.; f. *pulicaris*, Hffm.—Sarpsborg.
Arthonia astroidea, Ach.
A. varians (Dav.), Nyl.—Ouska.
A. patellulata, Nyl.—Haparanda.
Verrucaria subfuscella, Nyl.—Qvam.
V. margacea, Wahl.
V. æthiobola, Ach.
V. cataleptoides, Nyl.—Qvam.
V. beloniella, Nyl.—Qvam.
V. epidermidis, Ach.; var. *grisea*, Schær.—Alten, Kautokeino.
V. bryospila, Nyl.—Mountain over Kaafjord.
V. rhyponta, Ach.—Skelefteå.
V. albissima (Ach.), Nyl.; f. *tremula*, Krb.—Trondhjem.
Endococcus erraticus (Mass.), Nyl.
Mycoporum ptelæodes (Ach.), Nyl.—Churchyard, Torneå.
M. elachistoterum, Nyl.—On birch, Kautokeino.

ON THE OBSTACLES TO THE UTILIZATION OF NEW ZEALAND FLAX (*PHORMIUM TENAX*).

By W. Lauder Lindsay, M.D., F.R.S. Edin., F.L.S.

(*Read before the British Association*, 1867.)

The following opinions or suggestions are based on—

(1) The result of observations made during a tour in New Zealand in 1861–2; (2) a study of the wonderfully voluminous literature of New Zealand flax; and (3) a previous study * [ten years ago] of the general subject of foreign fibres as substitutes for those currently used in this country in the textile arts.

For present purposes I assume,—

(1) That the value of New Zealand flax, as a fibre suitable for the manufacture of cordage, textile fabrics, and paper, *has been established;* (2) that in Europe there is practically an *unlimited demand* for this class of fibre; and (3) that in order to such fibre as New Zealand flax becoming marketable,—

a. The supply must be both regular and large;

b. The quality must equal that of the fibres which at present command the market; while—

c. The cost of production must be such as to leave a considerable margin of profit on its market price;

d. Hence, any candidate for preference in the fibre market must submit to be rigorously tested by the following standards:—

A. Amount and regularity of supply.

B. Quality of the produce.

C. Its market price.

The utilization of New Zealand flax has been stimulated in every conceivable way;—by the self-interests of colonists and colonial governments; by the attraction of substantial Government rewards; by the high price offered in the British market for good samples of dressed fibre; by Industrial Exhibitions throughout the world, including New Zealand itself. So long ago as 1856, the general Government of New Zealand offered premiums to the extent of £4000 (the first, or highest, being £2000, the second, £1000, and five others of £200 each), "to the person who shall, by some process of his own

* Some results whereof will be found in articles on "Substitutes for Paper Material," in the 'Scottish Review' for October, 1858, and January, 1859.

invention, first produce from the *Phormium tenax*, or other fibrous plant indigenous to New Zealand, one hundred tons of merchandise;" it being stipulated that there should be a *bonâ fide* sale of the said merchandise in Europe, at an advance of 20 per cent. on the actual cost of the article when landed. The Provincial Government of Canterbury also subsequently offered a premium of £1000 with the same object in view; and still more recently, that of Otago promised a bonus of £500 to the firm or company that should first produce a ton of paper from *Phormium tenax* or other indigenous fibre, *equal in quality and price* to imported paper. So far as I am aware, however, *none* of these premiums have yet been gained. Infinite indeed have been the experiments instituted, the patents taken out, the efforts made to produce a marketable fibre; at least one special work (printed appropriately, moreover, on New Zealand flax-made paper) has been devoted to the subject;* while ever since the establishment of the New Zealand provinces, the local press has teemed with notices of the value of the indigenous flax, whose praises, indeed, appear to be a perennial source and theme of self-congratulation to the colonists. Nevertheless, my belief is that, as yet, no progress has been made beyond the products of the crude art and hand-labour of the Maori, with his simple mussel or cockle-shell; if, indeed, *his* results have been rivalled by the best specimens of colonial art! The endeavour to give New Zealand flax a permanent and satisfactory place in European commerce, has hitherto been a signal failure.

It is the object of the present communication to indicate what appear to me to be the chief causes of this failure; to point out what combination of circumstances has hitherto operated in preventing the practical application in the textile arts of a fibre acknowledged to possess a high value. Omitting details, which I propose giving elsewhere, I confine myself, at present, mainly to tabulating the principal obstacles to the utilization of the New Zealand flax-fibre.

I. *Amount and regularity of supply.*

There cannot be a sufficiently large or regular supply to meet the requirements, either of the local or European market, till—

1. The plant is systematically cultivated;
2. Labour is more abundant and cheaper.

The native plant is rapidly disappearing before colonial agriculture.

* Murray on *Phormium tenax*.

The Maoris, hitherto the only flax-dressers, are disappearing, only more slowly, though not less surely, than much of the indigenous vegetation; and at present the colonial population is comparatively so limited, and the demand for labour in connection with the gold-fields and the agricultural and pastoral interests so all-absorbing, that none is available for a field that does not at once offer a high rate of remuneration. The shrewd and observant Maoris have long recognized the superiority of the produce of cultivation, and have given themselves the trouble of cultivating, solely for its fibre, the New Zealand flax-plant, as carefully as they do their Maize or Potato as food-plants. Their methods of cultivation are, however, comparatively rude; and it remains for colonists to determine, by experiment on the large scale, what are the most suitable forms and circumstances of cultivation, in reference especially to such practical and important points as the kind of soil, or the artificial aids to growth.

II. *Quality of the fibre.*

Hitherto, almost exclusively, experiment has been made on the wild or native plant. But, as has been already stated, the Maoris have long been familiar with the fact, that the produce of the cultivated plant is superior; and they recognize, moreover, different varieties of the plant as yielding different qualities of fibre. Experiment and observation have, however, yet to determine,—

1. What are the botanical varieties or species, which yield the best qualities of fibre, whether in the—
   A. Cultivated, or
   B. Wild plant.
2. What are the best methods of cultivating the preferable varieties or species.
3. What is the best time for cutting down and preparing the leaf.

The colonist has yet also to imitate or rival (before he surpasses), on the large scale, the primitive means by which the Maori prepares the fibre so as to preserve its characteristic properties undamaged; he has yet to contrive suitable processes, chemical and mechanical,—more especially the latter—for dressing, bleaching, and dyeing the fibre. It has been obviously a common error of experimentalists to conclude that the processes and machinery, which have proved successful in preparing other fibres, should be equally suitable and successful here. But we are yet, I think, so far from knowing what are the *best* methods

of dressing, bleaching, and dyeing New Zealand flax, that we have not yet attained even to *suitable* processes on the large scale. More particularly the invention of suitable machinery, and the devising of appropriate chemical processes, appear to be urgent *desideranda*.

III. *Cost of production and market value.*

On account of the present scarcity and high value of labour in New Zealand, the cost of collecting the wild flax plant and of preparing its fibre is unavoidably great, much too great, indeed, to enable the colonist to offer the dressed flax in the European market at a price nearly equal to that of Russian flax, and other similar fibres, with which it must compete. The cost of proper cultivation of the plant and preparation of the fibre under present circumstances would be still greater; so that, even assuming the fibre to be of superior quality to its competitors in the market, New Zealand flax cannot, at present, be offered at anything like a similar price. Not only, however, has it to compete with many fibres of established reputation, which are easily and cheaply produced in countries where labour is abundant; not only has it to compete, as regards paper making, with rags and other waste products of civilization, which are necessarily greatly cheaper than such a fibre as dressed New Zealand flax,—but it will have to compete with hundreds of fibres of equal or nearly equal value, which abound in all our warmer colonies, and occur generally throughout temperate and warm parts of the world,—fibres, whose applications will be developed in proportion as colonization progresses, and as chemistry and mechanics are brought to bear on processes suitable for their preparation. My investigations in 1858 convinced me that fibre-producing plants abound throughout the world, and that the economical applications of their fibre only await the multiplication and cheapening of labour, the development of commerce, and the improvement of chemical and mechanical processes for its separation and preparation.

It would thus appear that the experimentalist on New Zealand flax works, at present, in the midst of difficulties. It is pretty certain that *the finest quality of flax can be produced only from the carefully cultivated plant*, but the cultivation of the plant is equally certainly attended with an expense that must render it *impossible for the producer to offer his fibre at such a price as will enable it to compete with hemp, jute, flax, and other well-known fibres, and leave him a profit on the sale.* On the other hand, I am not sanguine enough to say more than that

when and where labour is cheap and cultivation is easy, *experiment* on the large scale is justifiable by reasonable, but moderate, prospects of success. I believe that all the essential virtues of New Zealand flax will be found in many other fibres, which are not, as yet, subjects of preparation on the large scale; that labour will become cheaper and more abundant in other colonies besides New Zealand, which are quite as rich in fibre-producing plants; and that the difficulties attending the separation and dressing of the fibre will probably be more speedily overcome in the case of other fibrous plants than in that of the New Zealand flax-plant. In making so strong a statement, I have no desire to repress the natural efforts of the New Zealand colonists in the direction of experiment, but I do think, that in this case, as in the case of their coals and other indigenous produce, they entertain exaggerated ideas of value,—ideas which have led, and do lead, to rash speculation and unproductive experiment.

It appears to me that a hopeful direction of experiment is in connection with the *acclimatization* of the plant in older countries suited for its growth, where modifications of the machinery and chemical processes used in the preparation of other fibres of a similar kind might readily be brought to bear on the fresh leaf. I believe there are many countries suitable for the growth of New Zealand flax: and it remains, indeed, to be proved, whether it could or not be grown to a sufficient extent for experimental purposes in Britain, in several parts of which the plant has been found to thrive well.

CORRESPONDENCE.

Eryngium campestre.

Very few localities are known in Britain for the *Eryngium campestre*, and therefore a fresh one deserves to be recorded. At a meeting of the Malvern Naturalists' Club at Tedstone, Herefordshire, a short time since, when I was present as Vice-President, a clergyman (Rev. P. Onslow) produced for my inspection the leaves of a plant that he had gathered that morning in walking from Upper Sapey, an adjoining parish to Tedstone. There was some quantity of it, he said, but none in flower; I immediately recognized the leaves as those of *Eryngium campestre*, though the plant has never, to my knowledge, been gathered either in Herefordshire or Worcestershire. In walking from Upper Sapey to Tedstone a part of Worcestershire would be passed over, and

the place being so close to the boundary line, my informant was uncertain whether it was in Worcestershire or Herefordshire, and possibly it may be in both counties. However this may eventually turn out, the *Eryngium campestre* is an addition to Mr. Watson's "Mid-Severn sub-province," on what I trust may be deemed reliable authority.

EDWIN LEES, F.L.S.

Green Hill Summit, Worcester, October 14, 1867.

NEW PUBLICATION.

Materials for a Flora of Wakefield and its Neighbourhood. By T. W. Gissing. London and Huddersfield. 1867. (Pp. 59.)

The author of this little book is already known in connection with the flora of the West Riding by his 'Ferns of Wakefield,' printed in 1862; he has now extended his observations to the flowering plants of the district, and the result is the enumeration of nearly 600 species growing within twelve miles of the town.

There is little fresh matter in these 'Materials.' Miall and Carrington's 'Flora of the West Riding,' published in 1862, contains a full list of Wakefield plants, mainly contributed by Mr. Gissing himself; and to this list Mr. Gissing now adds only about a dozen species, probably native, though several exotics more or less naturalized are now first included in the Wakefield flora. *Melilotus arvensis*, *Trifolium resupinatum*, *Aremonia agrimonioides*, and *Setaria viridis*, are examples of the latter plants; "*Oxalis corniculata*," too, mentioned as "occasionally found in gardens," is probably the American *O. stricta*,—a frequent weed in such localities in many parts of England.

The 'Wakefield Flora' is not liable to the charge so often with justice preferred against local Floras, that of making out the largest possible number of species in the district examined. Indeed, Mr. Bentham's 'Handbook' seems to have been mainly employed, in its arrangement at all events, in the difficult genera. Nevertheless, a few segregate species (*e.g. Fumaria confusa* and *Stellaria Boræana*) are also mentioned; and the cultivated *Buxus* is, for some unexplained reason, introduced.

The "*Callitriche autumnalis*" mentioned is probably *C. pedunculata*, which, together with *C. platycarpa*, formerly went by that name.

Though by no means up to the mark, or to be reckoned an important addition to the literature of Yorkshire botany, the 'Wakefield Flora' is likely to prove a useful guide to many persons in that town, who are unable or unwilling to procure larger and more expensive works.

BOTANICAL NEWS.

From Old Calabar we learn that a tragedy of a most frightful character was enacted there on the 12th of September. It appears that a chief named Effium Adam died rather suddenly, and as his friends surmised that he had been the victim of foul play, the late chief's wives, six in number, and the entire household were assembled, and required to go through the most savage of ordeals, which was that each of them was compelled to swallow a large dose of the *Esera*, or Calabar poison bean (*Physostigma venenosum*, Balf.), to test their innocence of being parties to the supposed murder. Eight of the unfortunate victims had succumbed to the effects of the dreadful poison when the 'Athenian' left, and the others were not expected to survive.

M. Alphonse de Candolle writes to us the following from Geneva:—"Je m'occupe dans ce moment d'une nouvelle édition de mon opuscule sur les 'Lois de la Nomenclature.' Cette édition, renfermant les lois telles qu'elles ont été votées par le Congrès international de Paris, sera publiée aussi en anglais et en allemand. MM. Lovell Reeve et Cie. s'occupent de l'édition anglaise. La traduction se fait par M. Weddell, avec beaucoup de soin. Le texte des 'Lois' adoptées se trouvera aussi dans le volume officiel du Congrès, mais sans le commentaire contenu dans ma brochure, lequel explique et justifie les articles."

The thirty-third volume of the 'Nova Acta' contains two botanical papers of interest, viz. Dr. Schimper's Supplement to his monograph on the genus *Spiridens*, and Dr. Buchenau on several trees of *Quercus pedunculata* struck by lightning. Both are illustrated by plates.

Dr. Hooker is going to continue the publication of the 'Icones Plantarum,' of which his father published 1000 plates.

Professor Göppert, of Breslau, has published a commentary on the valuable collection of Coal Plants exhibited by him at the Paris Exhibition of this year.

Mr. Runge has read before the Silesian Society an instructive paper on Amber and its application, which elicited some valuable remarks from Professor Göppert on our present knowledge of the Amber Flora.

A new popular periodical, devoted to natural history and travel, is shortly to be commenced under the editorship of Mr. Andrew Murray, F.L.S.

A "Sociedad de Historia Natural" has been formed at Caracas, the capital of Venezuela; our esteemed correspondent Mr. A. Ernst being its principal promoter.

Under the title 'Natur und Gemüth,' M. Karl von Hippel has published (Berlin, A. Dunker) some popular sketches on North German vegetation, principally in its æsthetical and physiognomical aspect. The little work is elegantly printed, and written with considerable power.

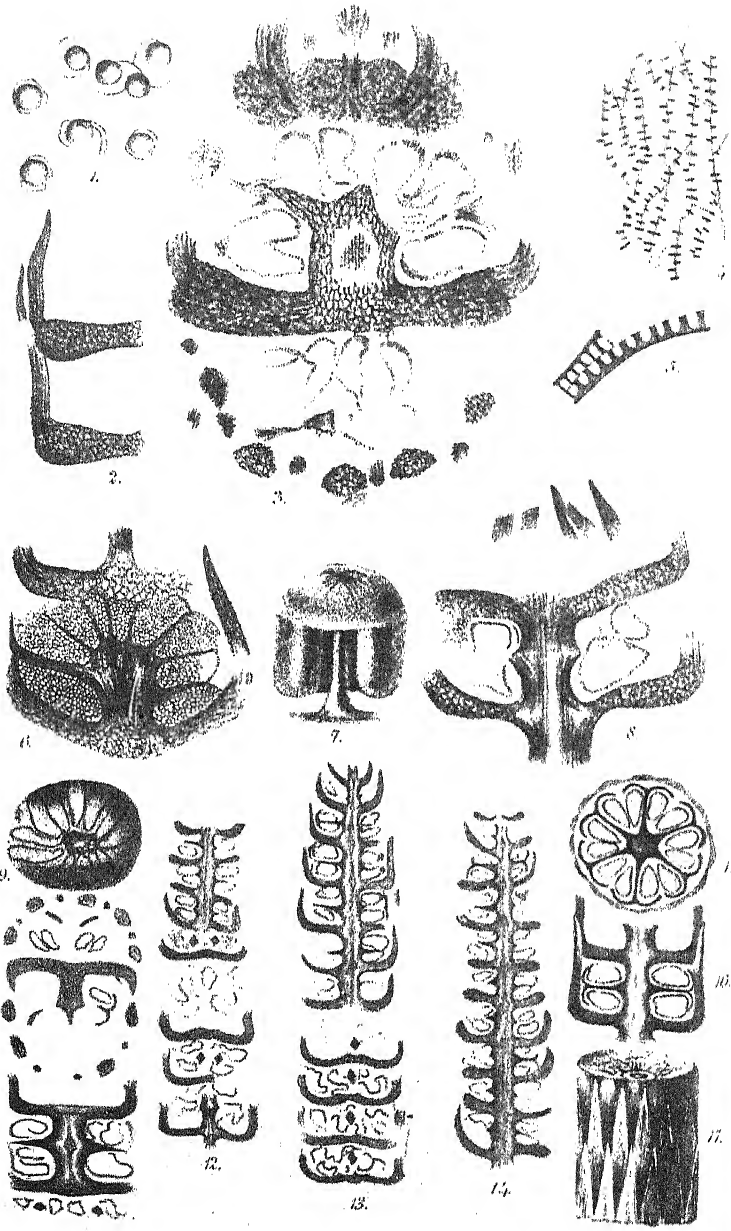
Dr. von Krempelhuber, of Munich, has just published the first volume of his 'History and Literature of Lichenology, from the earliest times to the year 1865' ('Geschichte und Litteratur der Lichenologie, von den ältesten Zeiten bis zum Schlusse des Jahres 1865). This promises to be of importance, describing the progress of Lichenology, giving the title of every publication having a bearing on the subject, in chronological order, and complete references to all known Lichens. The volume (price 10s.) may be ordered through Messrs. Williams and Norgate.

Dr. E. Rostan, San Germano Pignerol, intends to dispose of his duplicates of European plants at 20 francs per hundred (where not less than one hundred species are selected). Botanists who desire to see the catalogue of about 6000 species of vascular plants may communicate with J. Boswell Syme, Esq., 70, Adelaide Road, Haverstock Hill, London, N.W. Dr. Rostan has in preparation a catalogue of about 2000 cellular plants.

In the ninth volume of the 'Transactions of the Brandenburg Botanical Society,' Dr. Hegelmair has published an important paper on *Callitriche*, systematically considered. The paper must be regarded as a supplement to his previous one, and enumerates eighteen species; *Callitriche umbonata*, *Sonderi*, *Nuttalli*, *marginata*, and *antarctica*, being illustrated by figures. The species enumerated as having been found in Great Britain,—Watson, Babington, and Syme being the principal collectors,—are *C. verna*, L., *C. stagnalis*, Scop., *C. hamulata*, Kütz., *C. pedunculata*, De Cand., and *C. auctumnalis*, L. Dr. Hegelmair controverts the views advanced by Mr. B. Clarke in this Journal, with regard to the systematic position of *Callitriche* near *Caryophylleæ*, and is inclined to uphold the arrangement which brings it near *Hippuris*, *Myriophyllum*, and allied genera. A contribution to our knowledge of *Callitriche* may shortly be expected from the pen of Dr. Engelmann, and will be printed in the 'Transactions of the St. Louis (Missouri) Academy.'

Dr. Milde's 'Filices Europæ et Atlantidis, Asiæ Minoris et Sibiriæ,' which comprises the Ferns, Equisetums, Lycopodiums, and Rhizocarpæ of Europe, Madeira, the Canaries, Azores, Cape de Verds, Algéries, Asia Minor, and Siberia, and a monograph of all known Osmundas, Botrychiums, and Equisetums, has just been published at Leipzig. The whole of it is in Latin. M. Honoré's Ardoino's 'Flore Analytique du Département des Alpes-Maritimes' (Menton, 8vo) has also come to hand.

Errata.—Pages 285 and 286, alter the number of the Plate from LXX. to LXXI.



G.Massie. 12.10.66.

ON THE STRUCTURE OF THE FRUIT OF CALAMITES.

By Wm. Carruthers, Esq., F.L.S.,

Botanical Department, British Museum.

(Plate LXX.)

Rudolph Ludwig figured and described in the tenth volume of Meyer's 'Palaeontographica' (1861) certain fruit-spikes which he had ascertained to belong to *Calamites*. The external form, and even the shape and arrangement, of the sporangia were admirably exhibited in his specimens; but the state in which they were preserved was such that neither the minute structure of the organism nor the nature of the contents of the sporangia could be determined,—so that, although the author was strongly inclined to consider these fruits as belonging to a Cryptogam, there was nothing to show that the supposed sporangia were not true seeds.

In prosecuting my inquiries into the plants of the Coal Period, Dr. Hooker, in the most liberal manner, placed his valuable collection of sliced fossils at my command, and granted me the freest use of any specimens that would assist me in my investigations. From his cabinet I obtained several interesting sections of stems of *Calamites*, prepared by E. W. Binney, Esq., in 1854. On examining the specimens, I observed that numerous small strobili had been cut through in every direction, and that many of these were beautifully preserved, some showing their structure as perfectly as if they were fresh plants. Although differing in form and size, and in other characters which I shall presently point out, from the strobili figured by Ludwig, they agree in so many respects that I have no doubt they belonged to the same tribe of plants,—that, in fact, they are the fruits of the *Calamites*, stems and branches of which abound in the noduli in which they occur.

To prevent confusion in my descriptions, and following the practice necessarily adopted by palæontologists of giving to fruits that cannot be correlated with particular species a provisional name, I propose to employ the generic name *Volkmannia*, proposed by Sternberg for some of these fruits figured by him in his 'Flora der Vorwelt.' Brongniart has already referred this genus to *Asterophyllites*. In his valuable

paper on "Fossil Plants," contributed to the 'Dictionnaire Universel d'Histoire Naturelle' (1849), he says, "We should consider the various forms of *Volkmannia* as only the fructification of different species of *Asterophyllites*, but the specific connection of barren and fertile plants cannot be certainly determined; the examination of numerous specimens, and especially those united in the same branch and occurring in the same bed, will eventually clear this up. *Volkmannia polystachya*, Sternb., seems to belong to *Asterophyllites dubia*, Brongn., or to an allied form, perhaps *Calamites nodosus*, Lindl. and Hutt. If this connection be real, as I am inclined to believe, we should have a largish Calamitoid stem, almost arborescent, branches with leaves of *Asterophyllites*, and spikes of *Volkmannia* belonging to the same plant."

Believing this to be the true relation these different genera bear to each other, it is yet desirable to retain the generic name for the various fragments of the plants, until they can be built up into particular species. I shall accordingly designate the strobilus described by Ludwig as *Volkmannia Ludwigi*, and that which forms the subject of the present paper as *V. Binneyi*, after the distinguished geologist who has examined so successfully the vegetable treasures of the Lancashire Coal-field, and from whom Dr. Hooker, as I have already said, obtained the specimens which I have examined.

A. Binneyi is a slender, parallel-sided strobilus, 2 lines in diameter. I have seen no specimen exhibiting either extremity. The largest fragment is 10 lines long, and is composed of 15 leaf-whorls. The axis of the strobilus has a bundle of fine scalariform tissue in its centre, forming about a third of its diameter, and generally appearing free from the surrounding cellular tissue (Fig. 3), which is composed of somewhat elongated cells. At regular intervals the axis gives off whorls of appendages, which are alternately foliar and fruit-bearing. The foliar whorl consists of twelve leaves, which proceed horizontally from the axis until they reach the circumference of the strobilus, where they take an ascending direction. The leaves are united together by their margins until they reach the outside of the fruit, and form a continuous septum, dividing the strobilus into a series of chambers. The free exposed apices of the leaves are acuminate. A slender vascular bundle enters each leaf from the axis. The cells of the lower or horizontal portion are large and roundish, those of the upper free portion are smaller in diameter but more elongated. Each whorl of leaves

alternates with the similar whorl above, and in this respect differs from *V. Ludwigi*, in which the leaf-whorls are opposite to each other. The apices of the leaves of one verticil pass considerably beyond the united bases of those of the superior whorl, and thus form a somewhat closed strobilus, enclosing the sporangia. In transverse sections the attenuated apices are often seen as points between the larger sections of the leaf-whorl cut through, as shown in Figs. 3 and 10.

Between each foliar whorl there is a verticil of leaves, specially developed for the support of the sporangia. These leaves have a form nearly corresponding to those in the fruit-spike of *Equisetum*. They consist of an orbicular disk somewhat depressed at the centre, where the rhomboidal stalk is attached. The margin of the disk is reflexed. A considerable bundle of scalariform vascular tissue proceeds from the axis along the stalks. There are six leaves in each whorl, being half the number of the foliar verticil. Each whorl is opposite to the similar ones above and below, and not alternate with them, as in the foliar verticils. This is obvious from the longitudinal section represented at Fig. 13. The axis has been cut away from the lower half of this specimen, and the leaf-stalks are seen cut across, and in a perpendicular series. In *V. Ludwigi* there are fifteen foliar and five fruit-bearing organs, and both series of whorls are respectively opposite to the others of the same series. (*Vide* Journ. of Bot. Vol. IV. Tab. LVI. Figs. 7–12.) Ludwig describes the organs supporting the sporangia as thorn-like processes. I have, however, repeatedly noticed the section of the peltate apex, and examples may be seen in Figs. 10, 13, and 14. Each leaf exhibits two sporangia connected with it in transverse (Fig. 9), and the same number in longitudinal section (Fig. 13), making four in all. They are borne on the under surface of the expanded apex. I have not been able to detect the actual connection, but the sporangia are certainly free from the leaf-stalks, and the analogy with living organisms leads me to believe that when a larger series of specimens are examined, this will be found to be the mode of attachment. The wall of the sporangium is composed of irregularly elongated cells, with projections of a secondary deposit extending at right angles from the walls into the interior of the cells. (Fig. 4.) The spores are simple globular bodies, frequently exhibiting an outer and an inner wall. Sometimes, however, they appear to be composed of a single wall, and then the outer wall is represented by

lines more or less separated from the spores. These I believe to be elaters similar in structure to those of *Equisetum*. In the unripe spores they remain coiled up within the original delicate mother-cell; but when the spore has arrived at maturity, and the hygrometric conditions are present, the spiral bands burst the cell, and spread from the spore, as seen in Fig. 1.

The relation that this strobilus bears to the ordinary foliage of *Calamites* is obvious. The whorled leaves described under the name of *Asterophyllites* have been frequently found joined to stems of *Calamites*, putting beyond all doubt that they are the foliage of at least some species of this genus. The branches are in verticils around the stem, and the leaves are similarly arranged on the branches. The different species are distinguished by the number and form of the leaves. The strobilus is simply a shortened branch, with the leaves of one series of whorls developed into fruit-bearing organs, while the leaves of the alternating series are slightly modified to protect the sporangia. The arrangement of the strobili on the supporting branches also exactly agrees with that of the branchlets on the branches, as is seen in *V. Ludwigi*, Meyer's Palæont. x. tab. 11, fig. 2; *V. polystachya*, Sternb. Flora d. Vorwelt, i. tab. 41, fig. 1 *a*; *Aphyllostachys Jugleriana*, Gœpp. Journ. of Botany, Vol. V. Tab. LXVIII., etc.

The structure of this strobilus is obviously very near to that of the recent *Equisetaceæ*. Indeed, the only difference between the two is, that the strobilus of *Equisetum* is wholly composed of peltate fruit-bearing leaves, while in the fossil these alternate with a series of simple protecting leaves. This difference is not sufficient to warrant the establishment of a new Order for the fossil forms, especially when it is remembered that there are so many other points in which the fruits agree, viz. the form of the fruit-bearing leaf; the number and arrangement of the sporangia; the peculiar structure of the wall of the sporangium, which, though not identical in the two, is a very nearly allied structure; the form and structure of the spores; and especially the presence of elaters attached to the individual spores,—a character known only in *Equisetum* and *Calamites*. But, in admitting this fossil form into *Equisetaceæ*, the characters of that Order must be somewhat modified.

Whether this fossil strobilus exhibits a higher condition of the Order than that of the living genus, is a question on which there may be some difference of opinion. It seems, however, to me, reasoning by analogy

from Phanerogamous plants, that the special alteration of each alternating whorl for the protection of the sporangia indicates a higher structure than the conversion of all the leaves into fruit-bearing organs. And this opinion is established by a comparison of the stems and foliage of the recent with those of the fossil plants. The Order *Equisetaceæ*, represented by the single genus *Equisetum* among recent plants, consists of herbaceous plants, with striated fistulæ, branching and jointed stems, each joint terminating in a toothed sheath, which is the only foliage they possess. The stems are composed chiefly of cellular substance, with a few regularly-disposed bundles of annular and spiral vessels. *Calamites*, on the other hand, were plants with true leaves, and with arborescent and evidently perennial stems, the vascular tissue of which was entirely scalariform. The annular and spiral vessels are the only characters in the recent plants that may be held to indicate a higher position for them as opposed to the scalariform vessels of the fossils, a vascular structure existing in Ferns which form the bulk of the vascular Cryptogams, to the exclusion of other vascular tissue; yet this structure is not confined to them, but is found associated with other vascular tissue in plants of a much higher position, as in *Cycadeæ*, *Euphorbiaceæ*, etc. The stems of *Calamites* have been described as possessing medullary rays. I have never met with any indications of them in any stems I have examined. The radiating laminæ of cells interposed between the wedges of vascular tissue are perpendicular and not horizontal structures, and differ entirely from medullary rays. It is more than probable that stems belonging to widely-different genera have been described under *Calamites* or some of its synonyms. While, then, the strobilus scarcely differs from that of *Equisetum*, and necessitates these fossils being placed in this Order, its structure, as well as the structure of the whole plants, clearly indicate that the palæozoic fossils were a more highly organized group of plants than their representatives of the present day.

Brongniart, in the paper already quoted, refers the family *Asterophyllitea* to Gymnosperms, including in it an arborescent stem *Calamodendron* (*Calamitea*, Cotta); three forms of foliage, *Asterophyllites*, *Sphenophyllum*, and *Annularia*, with the fruits which he believes belong to the first of these forms, and have been described under the names *Volkmannia*, *Beckera*, *Bornia*, and *Bruckmannia*; a somewhat doubtful stem with leaves, *Hippurites gigantea*, figured by Lindley and Hutton,

and to which species Brongniart confines the name *Hippurites*; and lastly, a genus (*Phyllotheca*) of Oolitic plants from Australia, described by M'Coy, but which seems to me to have no affinity with the other genera of his family. He excludes *Calamites*, placing it in *Equisetaceæ*. I have in a former paper (Journ. of Bot. Vol. IV. p. 345) described the structure which I observed in some stems of *Calamites*, and which differs somewhat from anything before described; further light may be expected to be thrown on this subject when Mr. Binney publishes his observations on and illustrations of this tribe of fossils, on which he has been engaged for many years, and which I had hoped to have seen long ago. I have no doubt that a considerable diversity exists in the structure of the stems of these plants, but I am satisfied from numerous observations that no true medullary rays occur,—or rather that the larger or smaller wedges of cellular tissue which alternate with the vascular bundles cannot be considered true medullary rays. I hope, however, to examine this subject at greater length, and under more satisfactory circumstances, when I have investigated a collection of remarkably preserved stems and branches of coal plants which I obtained last autumn from the beds of trappean ash in Anan, where they were first detected by my friend E. A. Wünsch, Esq., and who has placed a large series of his own specimens at my service. With these materials, and with the results of Mr. Binney's labours before me, I shall be more able to deal with this subject.

Three forms of foliage (excluding *Hippurites*, founded on a single very fragmentary specimen) have been referred by Brongniart to *Asterophylliteæ*, but of these he considers *Asterophyllites* alone to be the foliage of *Calamodendron*. *Sphenophyllum* and *Annularia* he supposes to have been water-plants, and but for the similar structure of the fruit of the first genus, and the similar arrangement of the foliage in both to *Asterophyllites*, he seems inclined to consider these two genera to be Cryptogams. M. Coemans, who has recently monographed the two genera, takes the same view of their habit and systematic position. The evidence of the affinity of *Annularia* was not so complete in Brongniart's estimation as that of *Sphenophyllum*. Germar has, however, described and figured a fruit belonging to this form, and it agrees entirely with those of the other two forms. And that *Annularia* was not a slender floating plant is proved by a specimen in the collection of the British Museum, in which three leaf-bearing branches spring from the nodes of a thick calamitoid branch, about half an inch across.

There can be no reason, then, for doubting that all these forms having a similar arrangement of leaves, and a similar structure of fruit, and all moreover abounding in beds where the stems of *Calamites* occur, belong to the same set of plants. They do not differ more from each other than do the foliar appendages of many living genera. Even *Galium*, to which these fossils were referred by Luid, Walch, and the early observers, has amongst its species as great a diversity in the form of leaf, and almost in the venation, as exists in these fossils:—Compare *G. verum*, L., *G. rubioides*, L., *G. cordatum*, Rœm. and Sch.

Besides the fruits found associated with the foliage many occur isolated which have been referred to separate genera. I have already given the names of four such genera, referred by Brongniart to *Asterophyllites*, viz. *Volkmannia*, *Beckera*, *Bornia*, and *Bruckmannia*, and I may add *Huttonia* and *Aphyllostachys*, recently described by Gœppert, whose paper and drawing are reproduced in the present volume of the 'Journal of Botany,' p. 221, and Plate LXVIII.

The progress made in the elucidation of this singular tribe of plants since 1848, when Dr. Hooker published his Essay 'On the Vegetation of the Carboniferous Period, as compared with that of the present day,'—the most important contribution towards a correct interpretation of the coal plants ever published in the English language,—is very remarkable. He says under *Calamiteæ*, "I have in vain sought for any traces of structure in carefully prepared species of this genus; or for evidence of their being *Equisetaceæ* in the presence of those siliceous stomata with which that Order abounds, and which would surely have been preserved in the fossil state." We are now able to build up the whole plant, and to illustrate even its most minute microscopical details.

SYNOPSIS OF EQUISETACEÆ.

Order EQUISETACEÆ.—Stems herbaceous or arborescent, branched; leaves in whorls; fruit in terminal or lateral strobili; sporangia dependent from peltate leaves; spores globular, furnished with hygrometric elaters.

Suborder I. *Calamiteæ*.—Stem arborescent or frutescent, woody, branched; leaves in whorls, free or slightly united at their bases; fruit in terminal or lateral strobili composed of alternating series of whorled foliar and fruit-bearing appendages, four sporangia dependent from each peltate leaf.

Gen. 1. *Calamites.*

Sect. 1. *Asterophyllites.*—Leaves acicular, one-nerved.

2. *Annularia.*—Leaves linear, sometimes obtuse, one-nerved.

3. *Sphenophyllum.*—Leaves cuneate, several dichotomously dividing nerves.

Suborder II. *Equisetew.*—Stem herbaceous, articulated, hollow, branched; leaves reduced to a whorl of teeth united by their edges, and forming a sheath at the upper end of each articulation; fruit in terminal or lateral strobili composed entirely of peltate fruit-bearing leaves, four to seven sporangia dependent from each peltate leaf.

Gen. 2. *Equisetum.*

Obs. As the sections of *Calamites* agree in the form and structure of the fruit, it would be departing from the practice of botanists to establish them as separate genera from the diversity which prevails in their foliage, however remarkable that may be.

Explanation of Plate LXX.—Volkmannia Binneyi.

Fig. 1. Spores, showing the hygrometric elaters. 2. Section of a portion of two whorls of leaves, showing the extent to which the leaves of one whorl passed beyond the base of the other. 3. An obliquely transverse section, showing the axis with its central bundle of scalariform tissue, and the apices of the leaves of one whorl rising between the leaves of a superior whorl. 4 and 5. The cells of the sporangium. 6. An obliquely transverse section, showing several sporangia full of spores. 7. Ideal restoration of a single fruit-bearing leaf. 8. Longitudinal section, showing the apices of some leaves. 9. Transverse section, showing six pairs of sporangia. 10. An obliquely transverse section, showing the number of leaves in a whorl, the points of the leaves of a lower whorl alternating with those of the upper whorl, and the section of one of the sporangia bearing disks. 11. An obliquely longitudinal section of the space between two leaf-whorls containing the fruits. 12. A longitudinal section of a strobilus bent in the middle. 13. An obliquely longitudinal section in which the axis is cut away from the lower half, and the transverse sections of the stalks of the fruit-bearing leaves are shown in perpendicular series. 14. Longitudinal section. 15. Restored transverse section. 16. Restored longitudinal section. 17. Restored external aspect.

DISTRIBUTION OF BRITISH UMBELLIFERÆ.

By W. B. Hemsley, Esq.

The greater numbers of the genera and species of this family are very limited in area, few species being common to Europe and North America or to the northern and southern hemispheres; but 37—more

than half of the British species* extend to temperate Asia. Of the British species,* 8 have been found within the Arctic Circle, viz. *Cicuta virosa*, *Carum Carvi*, *Seseli Libanotis*, *Haloscias Scoticum*, *Angelica sylvestris*, *Archangelica officinalis*, *Peucedanum palustre*, and *Anthriscus sylvestris*; *Carum* being an introduced weed in both cases, and *Archangelica* is only found as an outcast or near remains of former cultivation in Britain. One, *Sanicula Europæa*, occurs in tropical Africa, extending to the Cape of Good Hope, where *Hydrocotyle* also occurs, the latter only reaching temperate Australia.

Only 7 of the British species are found in temperate North America, namely, *Haloscias Scoticum*, *Archangelica officinalis*, *Hydrocotyle vulgaris*, *Cicuta virosa*, *Carum Carvi*, and *Sium angustifolium*; the identity of the latter, however, is somewhat doubtful, and *Carum* may have been originally introduced. Of the whole number, 65 (including *Hedera*), there are 44 natives, 2 doubtful natives, 2 denizens, 1 doubtful denizen, 6 aliens, 4 doubtful aliens, 4 colonists, and 2 incognitæ. Of the natives 7 are annual, 5 are biennial, and 32 of perennial duration. The 2 doubtful natives, *Ægopodium Podagraria*, and *Fœniculum officinale*, are both perennials. One denizen, *Tordylium maximum*, is annual, and the other, *Myrrhis odorata*, is perennial; and the only doubtful denizen, *Smyrnium Olusatrum*, is biennial. Of the aliens, 2 are annual, 2 biennial, and 2 perennial; the doubtful aliens are all perennial, the 4 colonists are annuals, and the 2 incognitæ are perennials.

We will now proceed to the details of the distribution of each species.

1. *Hydrocotyle vulgaris*, L., including *H. interrupta*, Muehl., and *H. verticillata*, Thunb.† Native; perennial. Area general in Britain

* Including all mentioned in Watson's 'Cybele,' whether native or otherwise.

† Mr. Hemsley here combines two very distinct species without having any transition-forms to justify such a step. *Hydrocotyle vulgaris*, L., is by no means a widely distributed plant. I have not seen it from any other countries but the following, viz. Scotland (Gillies!), Wales (Newbould!), England (Leighton! Sowerby! E. Forster!), Jersey (Newbould!), France (Billot! n. 2853), Germany (Seemann!), and Switzerland (Herb. Mus. Brit.). *H. verticillata*, Thunb. (*H. interrupta*, Muehl., *H. vulgaris*, var. *communis*, Cham. et Schlecht.) enjoys a much wider geographical range, having been found in the Cape Colony (Wallich! Roberts! Lind.!), Virginia (Mitchell!), Carolina (Beyrich!), Massachusetts (Greene!), California (Chamisso), Jamaica (Wright! Swartz!), Port Jackson (R. Brown!), Gipps' Land (F. Mueller!), and the Sandwich Islands (U. S. Expl. Exped.!). It is easily distinguished from *H. vulgaris*, Linn., by its glabrous petioles, 11-nerved leaves, and uniformly brown fruit not emarginate at base.—B. SEEMANN.

and Europe, from southern Scandinavia to the Caucasus, temperate South Africa, America (New Granada, Mexico, Florida, and California), temperate Australia, Sandwich Islands, etc.

2. *Sanicula Europæa*, L., including *S. elata*, Ham.; *S. hermaphrodita*, Ham.; *S. montana*, Rwdt., *S. Javanica*, Bl., and *S. Chinensis*, Bl. Native; perennial. Distribution general in Britain and Europe, except the extreme north; in temperate Asia, from Persia to China and Japan, and extending to the mountains of tropical Asia (Neilgherries, Ceylon, Java, etc.); tropical Africa, east, Abyssinian mountains, west, Fernando Po, and Cameroons mountains, 4–7000 ft. Also extending to south temperate Africa.

3. *Astrantia major*, L. Alien? perennial. Probably not a native of Britain, and hitherto only found near the boundary of Shropshire and Herefordshire. Confined to southern and central Europe.

4. *Eryngium maritimum*, L. Native; perennial. Distribution general on the coast of Britain and throughout temperate Europe.

5. *E. campestre*, L. Alien?; perennial. Only met with in a few localities in England, and supposed to have been originally introduced. Scattered over temperate Europe, from the Mediterranean to Denmark.

6. *Cicuta virosa*, L. Native; perennial. Found in several parts of Britain, but always occurring sparingly. Temperate and arctic Europe, temperate Asia, and temperate and arctic North America.

7. *Apium graveolens*, L. Native; perennial. Common in salt marshes in England, and extending to Aberdeenshire in Scotland; temperate Europe and North Africa, from the Canary Islands, Azores, and Mediterranean, to Scandinavia; temperate Asia, Beloochistan, Affghanistan, Kashmir, etc.; South Africa, introduced; South America, extremely abundant in Chili, and extending from thence to Mexico, but probably introduced. I have also seen specimens from the Falkland Islands.

8. *Petroselinum sativum*, Hoffm. Alien; biennial. Often met with in Britain, especially to the south, as an escape from gardens. Supposed to be a native of the Mediterranean region, but now found as a weed all over temperate Europe, etc.

9. *P. segetum*, Koch. Native; biennial. Sparingly in southern and central England; central Europe, and western temperate Asia.

10. *Trinia vulgaris*, DC. Native; perennial. Rare and local in south-western England and south Ireland; central Europe.

11. *Helosciadium nodiflorum*, Koch, including *H. repens*, Koch. Native; perennial. Common in Britain, except the extreme north; common all around the Mediterranean.

12. *H. inundatum*, Koch. Native; perennial. Common throughout Britain and Europe, from the Mediterranean to South Scandinavia.

13. *Sison Amomum*, L. Native; biennial. Common in the south of England, and extending northward to Cheshire; southern Europe, and Teneriffe at 2000 ft., introduced?

14. *Ægopodium Podagraria*, L. Native?; perennial. Frequent in Britain, chiefly in the neighbourhood of dwellings; Europe, except the extreme north, and Siberia.

15. *Carum Carvi*, L., including *C. Indica*, Lindl. Alien; biennial. Established in some parts of England, although, doubtless, originally introduced; temperate and arctic Europe and Asia, and North Africa, but generally as a weed of cultivation. It is also common in the mountains of India up to 13,000 ft. in west Thibet. I have also seen specimens from North America, Fort Garrybas, Canada, and Awatchka Bay; but most likely introduced.

16. *C. verticillatum*, Koch. Native; perennial. In western England and Scotland, and southern Ireland, and south-western and central Europe.

17. *Bunium flexuosum*, With. Native; perennial. Throughout Britain and western Europe generally.

18. *B. Bulbocastanum*, L. Native; perennial. In two or three of the south-eastern counties of England, and throughout central and southern Europe, and central Asia.

19. *Pimpinella Saxifraga*, L. Native; perennial. Abundant in Britain, except, perhaps, the extreme north; Europe, from the Mediterranean to Scandinavia, and also in Siberia.

20. *P. magna*, L. Native; perennial. Local in some of the southern and central counties of England, with about the same range as the preceding species.

21. *Sium latifolium*, L. Native; perennial. In Britain, northwards to Stirlingshire. Apparently confined to Europe, and extending from the Mediterranean to Scandinavia. Introduced in Australia.

22. *S. angustifolium*, L. *Helosciadium Californicum*, H. and A., and *S. pusillum*, Nutt., probably belong to this species. Native; perennial. Scattered localities all over Britain, with the same European

range as the foregoing, and extending to western Asia (Persia, Affghanistan, etc.), and North America (N. Mexico); West Australia, introduced.

23. *Bupleurum tenuissimum*, L. Native; annual. Confined in Britain to England, and extending from the Mediterranean to Scandinavia.

24. *B. aristatum*, Bartl. Native; annual. In Britain, only reported from Devon, and confined chiefly to the south of Europe.

25. *B. falcatum*, L., including *B. scorzoneræfolium*, Willd.? Alien?; perennial. Ongar Heath, Essex, is the only habitat recorded for this country; temperate Europe and Asia, as far eastward as Japan, but not far northwards.

26. *B. rotundifolium*, L. Colonist; annual. Often met with in corn, etc., in England, and throughout Europe and western Asia. Introduced into North America.

27. *Œnanthe fistulosa*, L. Native; perennial. Frequent throughout Britain and Europe generally, except the extreme north.

28. *Œ. pimpinelloides*, L., including *Œ. Lachenalii*, Gmel., and *Œ. silaifolia*, Bieb. Native; perennial. Frequent in Britain, central and southern Europe.

29. *Œ. crocata*, L., including *Œ. apiifolia*, Brit. Fl. Native; perennial. Common in the south of England, and extending as far north as Norway, etc.; western Europe.

30. *Œ. Phellandrium*, L., including *Œ. fluviatilis*, Colem. Native; perennial. Frequent in Britain, rarer in Scotland; throughout temperate Europe and Siberia.

31. *Æthusa Cynapium*, L. Native; annual. An abundant weed in England, becoming scarcer northwards; Europe and Siberia.

32. *Fœniculum officinale*, All. Native?; perennial. Cliffs and rocks of the coast of south and mid-Britain; central and southern Europe, northern Africa, and western Asia (Affghanistan and Siberia). Introduced into Victoria, Australia, and Brazil.

33. *Seseli Libanotis*, L., including *Athamanta arctica*, Nym. Native; perennial. Limited to some of the south-eastern counties of England, and generally dispersed over central Europe and Asia, and, including *A. arctica*, Nym., to arctic Europe.

34. *Haloscias Scoticum*, Fries. Native; perennial. Confined to Scotland and northern England in Britain; throughout northern temperate, and arctic Europe, Asia, and America.

35. *Silaus pratensis*, Bess. Native; perennial. England and southern Scotland, and generally distributed over temperate Europe and Asia.

36. *Meum athamanticum*, Jacq. Native; perennial. North Britain, and the south-west of Europe generally, but not reaching Scandinavia.

37. *Crithmum maritimum*, L. Native; perennial. Abundant in south Britain and Ireland, scarcer in the north; Canary Islands and Mediterranean to the Black Sea.

38. *Angelica sylvestris*, L. Native; perennial. All over Britain, and temperate Europe and Asia; also within the Arctic Circle in Europe.

39. *Archangelica officinalis*, Hoffm.; this includes, according to Dr. Hooker,* the following names:—*A. littoralis*, Fries; *A. Norvegica*, Job.; *A. atropurpurea*, Hoffm.; *Physolophium saxatile*, Turcz.; *Cœlopleurum Gmelini*, Ledeb.; and *Pleurospermum Gmelini*, Bong. Incognita; perennial. Occasionally met with in Britain, but not indigenous; northern parts of temperate Europe, Asia, and America, and also within the Arctic Circle.

40. *Peucedanum officinale*, L. Native; perennial. Reported from Essex, Kent, and Sussex in England, erroneously with regard to the latter county; central and eastern Europe, and Russian Asia.

41. *P. palustre*, Mœnch. Native; perennial. Eastern England; central, eastern, and northern, temperate and arctic Europe, and Russian Asia.

42. *P. Ostruthium*, Koch. Alien?; perennial. Naturalized in North Britain, and many parts of north Europe; indigenous in central Europe.

43. *Pastinaca sativa*, L. Native; biennial. Southern and central England, and throughout Europe, except the extreme north; also in temperate Asia.

44. *Heracleum Sphondylium*, L. Native; perennial. Abundant in Britain, and temperate Europe and Asia.

45. *Tordylium maximum*, L. Denizen; annual. Local in England; southern and central Europe.

46. *Daucus Carota*, L., including *D. maritimus*, With., *D. gummifer*, Lam. Native; biennial. Throughout Britain, temperate Europe,

* 'Distribution of Arctic Plants,' Trans. Linn. Soc., vol. xxiii.

north Africa, and Asia. Cultivated in many parts of the world, and often met with as an outcast; as the Island of St. Paul, throughout India, Abyssinia, and the Cape of Good Hope, etc.

47. *Caucalis daucoides*, L. Colonist; annual. In south-eastern England; temperate Europe and Asia.

48. *C. latifolia*, L. Colonist; annual. Sparingly in a few localities in England; southern Europe, and western Asia.

49. *Torilis Anthriscus*, Gært., including *T. Japonica*, DC.? Native; annual. Abundant in Britain, and all over temperate Europe and Asia.

50. *T. infesta*, L. Native; annual. Frequent in England, rarer in Scotland. A weed of cultivation, indigenous only in temperate Europe and Asia, but now met with in the most distant parts of the world, as the Atlantic Islands, Australia, South America, etc.

51. *T. nodosa*, L. Native; annual. With about the same distribution in Britain as the foregoing. Indigenous in central Europe. It is now found in every part of the world where corn is grown. I have seen specimens from Mauritania, Syria, Persia, the Atlantic Islands, Juan Fernandez, Chili, Peru, Bermuda, etc.

52. *Scandix Pecten-Veneris*, L. Colonist; annual. A common cornfield weed in southern England, becoming rarer northwards, and seldom met with in the extreme north of Scotland; throughout Europe, except the extreme north; northern Africa, Atlantic Islands, and western Asia.

53. *Anthriscus sylvestris*, Hoffm., including *A. alpestris*, W. and G., *A. torquatus*, Dub., etc. Native; perennial. Abundant all over Britain, Europe, north Africa, and Russian Asia. Introduced in Abyssinia.

54. *A. Cerefolium*, Hoffm. Alien; annual. Occasionally met with in corn, etc., in England; temperate Europe; introduced into New Zealand.

55. *A. vulgaris*, Pers. Native; annual. Frequent in Britain. As a cornfield weed in southern and central Europe, and Russian Asia.

56. *Chærophyllum temulum*, L. Native; perennial. Common in England, rarer in Scotland; temperate Europe and Asia.

57. *C. aureum*, L. Alien; perennial. Reported from Scotland, but it is not a native; central and southern Europe.

58. *C. aromaticum*, L. Alien; perennial. Also reported from Scotland; with about the same distribution as the last.

59. *Myrrhis odorata*, Scop. Denizen; perennial. In many places in central and northern Britain; southern and central Europe, from the Pyrenees to the Caucasus.

60. *Echinophora spinosa*, L. Incognita; perennial. British specimens exist in old collections formerly found in this country; Mediterranean region.

61. *Conium maculatum*, L. Native; biennial. Scattered nearly all over Britain; temperate Europe, North Africa, Atlantic Islands (introduced?), and Asia; introduced into Brazil.

62. *Physospermum Cornubiense*, DC. Native; perennial. This, if different from the Continental *P. aquilegifolium*, is restricted to the south-west of England.

63. *Smyrnium Olusatrum*, L. Denizen?; biennial. South of England; Mediterranean region.

64. *Coriandrum sativum*, L. Alien; annual. Sometimes met with in cornfields, etc., in Britain; a native of the Mediterranean region, but now met with wherever corn is cultivated. I have seen specimens from Affghanistan, Western Himalayas, Khasia, Assam, Bombay, Madras, Ceylon, Japan, Formosa, Amur, Hongkong, Cape of Good Hope, Brazil, Bolivia, Mexico, etc.

65. *Hedera Helix*, L.* Native; perennial. All over Britain; throughout Europe, except the extreme north; north Africa, Atlantic Islands; Asia, from Persia, Affghanistan, Himalayas, 6–8000 feet, to Japan.

The following table is arranged according to the divisions adopted by Mr. Baker for the Ferns at p. 74 of this Vol., and answers to the numbers as follows:—

Frigid Zone.

1. Within the Arctic Circle.

Temperate Zone.

2. Temperate Europe, north Africa, Azores, Madeira, and Canaries.
3. Temperate Asia.
4. Temperate North America, excluding Mexico.
5. Temperate South Africa.

* Mr. Hemsley here combines three, according to my view, very distinct species,—*H. Helix*, L., *H. Canariensis*, Willd., and *H. Colchica*, C. Koch. The true *H. Helix*, L., is not found out of Europe. *H. Canariensis*, Willd., I have seen from Ireland and Portugal.—B. SEEMANN.

6. New Zealand and temperate Australia.
7. Temperate South America.

Torrid Zone.

8. Tropical Africa.
9. Tropical Asia and Polynesia.
10. Tropical America.

Those with a * are only introduced.

	1	2	3	4	5	6	7	8	9	10
1. Hydrocotyle vulgaris	...	1	...	1	1	1	...	...	...	1
2. Sanicula Europæa	...	1	1	...	1	...	...	1	1	...
3. Astrantia major	...	1	...	...	...	...	...	...	...	...
4. Eryngium maritimum	...	1	...	...	...	...	...	...	...	...
5. E. campestre	...	1	...	...	...	...	...	...	...	...
6. Cicuta virosa	1	1	1	1	...	...	...	...	...	...
7. Apium graveolens	...	1	1	...	1*	...	1*	...	...	1*
8. Petroselinum sativum	...	1	...	...	...	1*	...	..	...	...
9. P. segetum	...	1	1	...	...	...	...	...	...	...
10. Trinia vulgaris	...	1	...	...	...	...	...	...	...	...
11. Helosciadium nodiflorum	...	1	...	...	...	...	...	...	...	...
12. H. inundatum	...	1	...	...	...	...	...	...	...	...
13. Sison Amomum	...	1	...	...	...	...	...	...	...	...
14. Ægopodium Podagraria	...	1	1	...	...	...	...	...	...	...
15. Carum Carvi	1*	1	1	1*	...	...	...	...	...	...
16. C. verticillatum	...	1	...	...	...	...	...	...	...	...
17. Bunium flexuosum	...	1	...	...	...	...	...	...	...	...
18. B. Bulbocastanum	...	1	1	...	...	...	...	...	...	...
19. Pimpinella Saxifraga	...	1	1	...	...	...	...	...	...	...
20. P. magna	...	1	1	...	...	...	...	...	...	...
21. Sium latifolium	...	1	...	...	...	1*	...	...	...	...
22. S. angustifolium	...	1	1	1?	...	1*	...	...	...	...
23. Bupleurum tenuissimum	...	1	...	...	...	...	...	...	...	...
24. B. aristatum	...	1	...	...	...	...	...	...	...	...
25. B. falcatum	...	1	1	...	...	...	...	...	...	...
26. B. rotundifolium	...	1	1	1*	...	...	...	...	...	...
27. Œnanthe fistulosa	...	1	...	...	...	...	...	...	...	...
28. Œ. pimpinelloides	...	1	...	...	...	...	...	...	...	...
29. Œ. crocata	...	1	...	...	...	...	...	...	...	...
30. Œ. Phellandrium	...	1	1	...	...	...	...	...	...	...
31. Æthusa Cynapium	...	1	1	...	..	...	...	...	...	...
32. Fœniculum officinale	...	1	1	...	...	1*	...	...	...	1*
33. Seseli Libanotis	1	1	1	...	...	...	...	...	...	...
34. Haloscias Scoticum	1	1	1	1	...	...	...	...	...	...
35. Silaus pratensis	...	1	1	...	...	...	...	...	...	...
36. Meum athamanticum	...	1	...	...	...	...	...	...	...	...
37. Crithmum maritimum	...	1	...	...	...	...	...	...	...	...
38. Angelica sylvestris	1	1	1	...	...	...	...	...	...	...
39. Archangelica officinalis	1	1	1	1	...	...	...	...	...	...
40. Peucedanum officinale	...	1	1	...	...	...	...	...	...	...

	1	2	3	4	5	6	7	8	9	10
41. P. palustre	1	1	1	...	...	...	...	...	...	...
42. P. Ostruthium	...	1	...	...	..	...	...	...	...	...
43. Pastinaca sativa	...	1	1	...	...	...	...	...	...	...
44. Heracleum Sphondylium . .	...	1	1	...	...	...	...	...	...	...
45. Tordylium maximum . . .	...	1	...	...	...	...	...	...	...	...
46. Daucus Carota	...	1	1	...	1*	...	...	1*	1*	...
47. Caucalis daucoides	...	1	1	...	...	...	...	...	...	...
48. C. latifolia	...	1	1	...	...	...	...	...	...	...
49. Torilis Anthriscus	...	1	1	...	...	...	...	...	...	...
50. T. infesta	...	1	1	...	...	1*	...	...	...	1*
51. T. nodosa	...	1	1	...	...	...	1*	...	1*	1*
52. Scandix Pecten-Veneris . . .	...	1	1	...	...	...	...	...	...	...
53. Anthriscus sylvestris	1	1	1	...	...	...	...	1*	...	...
54. A. Cerefolium	...	1	..	...	...	1*	...	...	...	...
55. A. vulgaris	...	1	1	...	...	...	...	...	...	...
56. Chærophyllum temulum . .	...	1	1	...	...	...	...	...	...	...
57. C. aureum	...	1	...	...	...	...	...	..	...	...
58. C. aromaticum	...	1	...	...	...	...	...	...	...	...
59. Myrrhis odorata	...	1	...	..	...	...	...	...	...	...
60. Echinophora spinosa	...	1	..	...	...	...	...	...	...	..
61. Conium maculatum	...	1	1	...	...	...	...	...	...	1*
62. Physospermum Cornubiense .	...	1	...	...	...	...	...	...	...	...
63. Smyrnium Olusatrum . . .	...	1	..	...	...	...	...	...	...	...
64. Coriandrum sativum	...	1	1*	...	1*	...	1*	...	1*	1*
65. Hedera Helix	...	1	1	...	...	...	...	...	...	...

ON THE ARTIFICIAL PRODUCTION OF *AGARICUS (VOLVARIA) LOVEIANUS*, *Berk.*

By W. G. Smith, Esq.

Agaricus (Volvaria) Loveianus has never been observed elsewhere than in this country; and till the present autumn (when I succeeded in raising it artificially) nothing had been seen of it for thirty-four years. The first record of this rare Agaric is found in the third edition of Knapp's 'Journal of a Naturalist,' where it is described under the name of *A. surrectus*. Knapp gathered several specimens of it in October, 1819, growing parasitically upon the pilei of a confluent mass of *A. (Clitocybe) nebularis*, Batsch. After a lapse of fourteen years the Rev. M. J. Berkeley lighted on a batch near Stamford, Norths. (Oct. 10, 1833), also parasitic, "upon half-decayed and, in general, distorted specimens" of *A. nebularis*. Fortunately both Berkeley and Knapp give capital illustrations of the species,

Knapp's especially being highly curious, for there the parasites are larger than the hosts themselves.

A. Loveianus must always possess great interest, for it is a good-sized species, attaining a diameter of three inches and a similar height, belonging to the subgenus *Volvaria* (and of course with pink spores), found springing from a volva on the top of another Agaric, belonging to the subgenus *Clitocybe* (with *white* spores).

The host (*A. nebularis*) is rare about London, and appears to be local elsewhere; but I have found it in abundance in several places, notably in the woods about Oxford, and in old fir-plantations. It takes its name from its singular cinereous *clouded* pileus, which is generally slate-coloured, deep grey or brown, *clouded with white*. This white tint is sometimes a mere bloom, at other times (and, generally, in old and distorted specimens) it acquires the character of a thick floccose web, attaining a thickness of a sixteenth of an inch.

Last autumn the thought struck me that this white substance so common on *A. nebularis* might be nothing less than a mere state of the mycelium of *A. Loveianus* itself, and only requiring certain conditions to enable it to develope into the perfect plant. At the beginning of October, my friend Miss Lott, of Barton Hall, South Devon, sent me a batch of Fungi found growing amongst rotten fir-leaves. Amongst the fungi were many specimens of *A. nebularis*, bearing the accustomed white stains or smears. After gathering all the rotten fir-leaves, and thoroughly saturating them with rain-water, I half-buried the plants of *A. nebularis* amongst them, and placed all together under a bell-glass in a warm room. The white substance then soon showed its true character, and ran over the whole mass, making no distinction of either pileus, stipes, or gills; small white nodosities soon began to appear, and after a fortnight I had the pleasure of seeing the fully-developed *A. Loveianus*. My specimens were small, the volvas very large, and pale sienna in colour; in other respects Mr. Berkeley's description in the 'British Flora' is so perfect that it is not necessary to describe the species anew. Not the least singular part of the case is, that though I have repeatedly written to Miss Lott regarding this Agaric, with request for a sharp look-out for it, nothing has ever been seen of it in the fir plantations of Barton Hall.

An end was put to my experiment by a sudden onslaught of a third (this time microscopic) parasite, viz. *Penicillium crustaceum*, Fr.,

which, in a single night, ran over the whole lot; not, however, before I had secured careful drawings to accompany my large figure of *A. nebularis* for the Food Department of the South Kensington Museum.

I have observed exactly similar spawn on *A. grammopodius* and *A. prunulus*, when they have grown on dead fir-leaves with *A. nebularis*.

ON *ASTER SALIGNUS*, *Willd.*

By Professor C. C. Babington, M.A., F.R.S.

Stem glabrous, panicled, with subracemose branches. Intermediate leaves lanceolate, attenuate at both ends, serrate in the middle; lower subspathulate, blunt, entire; uppermost sessile, half-clasping. Leaves on branches linear or linear-lanceolate, entire. Involucre with nearly equal, lax phyllaries.

A. salignus, Willd. Sp. Pl. iii. 2040; De Cand. Prod. v. 239; Fl. Fr. v. 470; Nees, Gen. et Sp. Aster. 90; Fl. Dan. xiv. 2475; Reichenb. Fl. Germ. i. 247; Icon. Fl. Germ. xvi. 7, t. 17; Gren. et Godr. Fl. Fr. ii. 103; Koch, Syn. Fl. Germ. 386.

A. salicifolius, Scholl. Suppl. Fl. Barb. 328, cum icone; Roth, Tent. Fl. Germ. i. 367, ii. 352 (not of Aiton, Hort. Kew. iii. 203).

A. Hungaricus, Poir. Enc. Méthod. Suppl. i. 496.

Root creeping (not creeping, *Scholl.*). Stem smooth, 2–3 feet high, pale green, becoming purplish after the flowers, glabrous, but with a decurrent purple villose line, or altogether purple. Leaves alternate; the primordial leaves spathulate, blunt, entire; those above the middle of stem lanceolate, attenuate at both ends, serrate in the middle of each side; uppermost half-clasping, narrower; leaves of branches often very narrow, entire. Heads small, terminal on stem and branches. Phyllaries few, linear-lanceolate, acute, green with a white margin, fringed with crisped hairs; inner pinkish; all about equal in length; outer lax. Radiant florets white at first, afterwards violet; those of the disk yellow, ultimately reddish. Fruit villose. Pappus white.

This plant appears to have been long known to Colonel Drummond Hay as growing upon the left bank of the river Tay, at a short distance below Perth, but he did not know its name. He showed it to Professor Newton, of Cambridge, at that place, in 1867, and the Pro-

fessor was so good as to gather and dry a specimen for me. But I had previously received it from Mr. John Sim, the well-known botanist of Perth, in the year 1866. He also gathered it on the banks of the Tay, where he had known of its existence for some years. Not knowing its name, he sent it to me for determination. Unfortunately, I laid the specimen aside and neglected it. In the Trans. of the Edinburgh Bot. Soc. (viii. 359) it is stated that "Professor Balfour exhibited specimens of an *Aster*, apparently *A. salignus* (*salicifolius*), which he had found growing in quantity on an island in the Tay near Dalguise [near Dunkeld], far from any gardens," at the meeting of that Society, held Nov. 9th, 1865. Also, in 1864, I received a specimen of the same plant from Mr. John Brown, a distinguished entomologist of Cambridge, which he had gathered in the summer of that year, from "a large patch of it in Wicken Fen," in Cambridgeshire. And, finally, it was also discovered in that same fen, independently, by Mr. W. P. Hiern, M.A., of St. John's College, in August, 1867, and the fact communicated by him to the meeting of the British Association at Dundee in that year.

It appears from the above facts that the plant is well established in Perthshire and in the fens of Cambridgeshire, and we have to determine its claims to be considered as forming a part of the Flora of Britain. We learn from Willdenow that it grows on the banks of the Elbe and in Hungary. I have a specimen of it from the latter country, and believe that I possess one from the former, but cannot lay my hand upon it. Grenier and Godron record that it is found near Strasbourg, but unfortunately add that it came originally from America. This mistake has probably arisen from the confusion between the plant once called *A. salicifolius* in America and the European similarly-named plant of Scholler. De Candolle and Nees von Esenbeck, having better information, give our plant as a native of Europe alone; and it appears to be one of the very few species of *Aster* which are natives of this continent.

Its name is involved in much confusion, and we are probably wise in following Willdenow in calling it *A. salignus*, notwithstanding the fact that Scholler's name, *A. salicifolius*, is rather older (1787) than the similar name given to the American plant by Aiton in 1789. The difficulty has arisen from very many botanists having confounded the American *A. salicifolius* (itself apparently a very confused species,

if not more than one) with the European *A. salicifolius* of Scholler. There can be no doubt about Scholler's plant, for he gives a very full description of it, and has represented it in an admirable plate. Willdenow seems to have found Aiton's plant from America to be generally known by the name of *A. salicifolius*, and thought it wise to retain that name for it, notwithstanding the earlier publication of Scholler's little-known 'Flora Barbiensis.'

It is remarkable that so conspicuous a plant should have so long remained unnoticed in England and Scotland. In the former case, the extreme wildness of the unreclaimed fen which it inhabits, and the late time of its flowering (August), when most of the naturalists of Cambridge are away from home, may perhaps be considered as a sufficient cause. In the latter country it was probably looked upon as some American *Aster* which had escaped from cultivation. As it appears that this plant is not a native of America, but of the European continent, where it grows by the sides of rivers and in swamps, we may reasonably suppose that it is also a native of Great Britain. In all probability, now that attention is directed to it, the plant will be found in other places besides Perthshire and Cambridgeshire.

NOTE ON CALIMERIS, *Nees*, AND HETEROPAPPUS, *Less.*, WITH DESCRIPTION OF A NEW SPECIES OF THE LATTER GENUS.

BY H. F. HANCE, Ph.D., ETC.

The plant described by me (Ann. Sc. Nat. 4. Ser. xv. 225) under the name of *Asteromæa Pekinensis*, proves, on comparison with an authentic American specimen from the herbarium of the Petersburg Imperial Garden, to be identical with *Calimeris integrifolia*, Turcz. Torrey and Gray had already (Fl. N. Amer. ii. 157) remarked that *C. incisa*, De Cand., and *C. integrifolia*, Turcz., were the only true *Calimerides* known to them, taking the genus as originally founded by Cassini, and that its systematic position was next to *Boltonia*. Mr. Bentham, in the 'Flora Hongkongensis,'—with good reason, it seems to me,—reduced it to this genus, observing, however,—I do not know on what ground,—that it includes *C. incisa*, "*but not the other species*

of Calimeris *known to him*." But there can be no doubt that *C. integrifolia* is a close ally of *C. incisa* and *Boltonia glastifolia*, and that it has much less affinity with the setipappose plants (§ *Asteromaeris*, Turcz.) erroneously referred by various authors to the genus. The transition from the true Asters to the Daisies is effected by *Heteropappus*, *Boltonia*, *Brachycome*, *Bellium*, and *Bellis pappulosa*, Boiss.; the last-named plant, placed in *Bellium* by Kunze, being considered by Lange and Willkomm (Prodr. Fl. Hispan. ii. 31) as a mere variety of *Bellis sylvestris*, Cyr. As *Boltonia glastifolia* has quite undivided leaves, the North Chinese species may probably better assume the name of *Boltonia Pekinensis*, which, concurring in Mr. Bentham's reduction, I proposed for it in my 'Adversaria,' than the trivial designation applied to it by Turczaninow.

The following is a very interesting addition to the Southern Chinese Flora:—

Heteropappus Sampsonia, n. sp.; dense cinereo-hirsutus, caulibus simplicibus vel a basi ramosis superne corymboso-paniculatis ramulis elongatis, foliis elliptico-lanceolatis calloso-mucronatis subuninerviis utrinque tomentosis ciliatis, pedunculis a basi fere bracteis linearibus præditis, capitulis hemisphæricis 3–5 lineas diametro, involucri squamis circiter 3-serialibus pilosis apice colorato-mucronatis interioribus magis herbaceis, ligulis albis, pappi radii setis albidis brevissimis connatis pappi disci setis albidis uniseriatis subæqualibus scabris apice inconspicue incrassatis achænio castaneo albo-hirto duplo longioribus, receptaculo plano alveolato.—In herbidis secus fluvium West River, provinciæ Cantoniensis, Januario 1867, coll. cl. Sampson. (Exsicc. n. 13776.)

Perfectly distinct in foliage, in its much smaller capitula, and in the relative length of the pappus of both disk- and ray-florets, from *H. hispidus*, Less., and *H. decipiens*, Maxim. (perhaps merely varieties of one species), with each of which I have compared it. Prof. Asa Gray remarks (Mem. Amer. Acad. vi. 394), "The genus *Heteropappus* ought to subside into a section of *Calimeris*." It is clear from the description of his *C. ciliata*, that he now understands by this name not the typical species of Cassini, reduced to *Boltonia* by Bentham, and which, as I have just observed, Dr. Torrey and he had originally also taken as the type of *Calimeris*, but the uniserial or subuniserial capillary-pappose plants, which, in my judgment, cannot properly be separated from

Aster. If these reductions are admitted, *Calimeris* becomes a mere "nominis umbra;" but, in any case, *Heteropappus* seems to me abundantly distinct from either group. "Sunt enim genera haec optime diversa," writes Maximowicz (Prim. Fl. Amur. 146), referring to *Heteropappus* and *Calimeris* § *Eucalimeris*, Turcz.

Whampoa, S. China.

REVISION OF THE NATURAL ORDER BIGNONIACEÆ.

BY BERTHOLD SEEMANN, Ph.D., F.L.S., ETC.

(*Continued from Vol. I. p.* 258.)

CAMPSIS, Lour. Fl. Cochinch. (ed. Ulyssipon. 1790) p. 377; Seem. Journ. of Bot. 1863, p. 19; Bureau, Monogr. Big. t. 14. Calyx campanulatus, regularis, sub-5-gonus, 5-fidus, laciniis ovatis acutis arrectis æqualibus. Corolla infundibuliformis, tubo elongato subincurvo, limbo inæquali 5-lobo patente. Genitalia inclusa. Stamina 4, didynama, cum quinto sterili. Antheræ discretæ, glabræ. Pollen ellipsoideum. Ovarium 2-loculare, annulo hypogyno cinctum. Stylus elongatus; stigma 2-lamellatum. Capsula cylindrica v. sub-4-gona, lævis, septis dissepimento contrariis. Semina alata, ∞-seriata.—Frutices Asiæ tropicæ v. subtropicæ necnon Amer. bor. incolæ, ramis scandentibus radicantibus, foliis imparipinnatis v. 3-foliolatis, racemis axillaribus v. terminalibus, simplicibus v. paniculatis, floribus aurantiacis coccineis v. roseis.—*Bignoniæ*, *Tecomæ*, et *Incarvilleæ* sp. Auct.

At p. 19 of the Journ. of Bot. 1863, I restored the genus *Campsis*, which was founded by Loureiro upon a species gathered by him about Canton, in S. China (long an inmate of our gardens), and which is one of the many genera which Japan has in common with the United States.

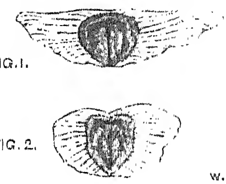
1. *C. Curtisii* (sp. n.), Seem. (Fig. 1); foliis 4–5-jugis cum impari, foliolis ovatis acuminatis in petiolum angustatis serratis, supra glabris, subtus petiolulisque hirsuto-pubescentibus, petiolis inter juga barbatis; paniculis terminalibus, pedunculis (viridibus) tenuibus 1–3-floris, ultimo 1-floro; calyce glabro; tubo corollæ calyce duplo longiore (graciliore quam in *C. radicante*); seminum alis triangularibus acutis (v. v. sp.).—*Bignonia radicans*, *β. minor*, De Cand. Prod. ix. p. 223. *Tecoma*

radicans major, Loud. Arboret. p. 1260? Catesby, Carol. i. p. et t. 65. —Geogr. Distr. St. Louis (Drummond! Seemann!).

Differs specifically from *C. radicans*, as was long ago suspected by Curtis (Bot. Mag. sub t. 488), by its more delicate and slender habit, green pedicels, tube of corolla twice the length of the calyx, more yellow flowers, and triangular and longer wings of seeds (Fig. 1). Curtis says, "The *Bignonia radicans minor* has by many been considered as a variety of the plant here figured [*i. e. Campsis radicans*, Seem.], but it differs so essentially in many particulars that it seems to be entitled to be regarded as a species: there is an old plant of it and the '*major*' growing near together in Chelsea Garden, in which we have observed that the '*minor*' is a much smaller plant, more disposed to throw out roots from its stems, infinitely less inclined to flower, varying greatly in the form of its leaves, and in the size and colour of its blossoms; and upon the whole much less ornamental and desirable." On inquiry I learn from Mr. Thomas Moore, the present Curator of the Chelsea Garden, that the plant here referred to by Curtis is not now in existence; and I may add that, although the species seems to have been rather common in our gardens in former times, I have not been able to see a living garden specimen, though I made my wish known through the press, and wrote to many of my botanical friends about it. Catesby, who, in his 'History of Carolina,' gives a plate of the plant, says, "The humming-birds delight to feed on these flowers, and, trusting themselves to go into the flowers, are sometimes caught." *C. Curtisii* seems to have a more southern range than *C. radicans*; I remember gathering it close to St. Louis, Missouri, but on the eastern side of the Mississippi.

FIG. 1.

FIG. 2.



W.G.S.

Seeds of *Campsis Curtisii* and *radicans*.

2. *C. radicans*, Seem. mss. (Fig. 2); Bureau, Monogr. Big. Atlas, p. 16. t. 14; foliis 4–7-jugis cum impari, foliolis ovatis v. ovato-oblongis acuminatis, sessilibus v. breviter petiolatis, dentatis serratis v. incisis, subtus glabris v. hirsuto-pubescentibus; paniculis terminalibus v. axillaribus, pedunculis (purpureis) 1–3-floris, ultimo 1-floro; calyce læv glabro; tubo corollæ calyce vix superante (?); antheris ovato-oblongis obtusis; capsula lævi glabra tereti longe acuminata, basi attenuata

seminum alis ovatis obtusissimis (v. v. cult. et v. s. sp.). *Bignonia radicans*, Linn. Sp. 871; Bot. Mag. t. 485. *Tecoma radicans*, Juss. Gen. n. 139. —Geogr. Distrib. Kentucky (Short! Robert Peter!).

The specimens sent by Short from Kentucky differ materially from the form figured in the Bot. Mag., the number of leaflets being greater, and their margin more deeply serrate, whilst underneath they are thickly covered with down.

3. *C. adrepens*, Lour. Fl. Cochinch. l. c.; Seem. Journ. Bot. 1863, p. 19; ramis glabris; foliis 3–4-jugis cum impari, petiolis inter juga barbatis, foliolis ovatis acuminatis dentato-serratis, utrinque glabris; floribus terminalibus paniculatis, pedunculis 3-floris cernuis biglandulosis; calycis glabri nervis prominulis, laciniis acuminato-subulatis; tubo corollæ (glabræ) calyce vix longiore; antheris cordato-ovatis obtusis; capsula (ex Loureiro) tetragona.—*Rjotsjo*, Kæmpf. Am. Ex. 856. *Bignonia grandiflora*, Thunb. Fl. Jap. 253; Banks, Icon. Kæmpf. t. 21; Sims, Bot. Mag. t. 1398; Salisb. Parad. Lond. t. 62; Andr. Bot. Rep. t. 493. *Bignonia Chinensis*, Lam. Dict. i. p. 423. *Tecoma grandiflora*, Del. Herb. Amat. t. 286; Loud. Arboret. 1260. t. 1092. *Incarvillea grandiflora*, Poir. Dict. Sc. Nat. xxiii. p. 53.—Geogr. Distr. Japan, S. China (Loureiro), N. China (Fortune!). Cultivated in European gardens.

4. *C. Fortunei* (sp. n.), Seem. mss. in Herb. Hook.; ramis glabris; foliis oppositis . . . .; floribus terminalibus paniculatis, pedunculis 3-floris rectis; calyce nervis obscuris basi glabro, laciniis acutis albido-villoso-tomentosis; corolla extus villosa, intus glabra maculata, tubo calyce duplo longiore, laciniis rotundatis; filamentis basi glabris; antheris ovatis obtusis (v. s. sp.).—Geogr. Distr. China (Fortune! n. 48).

Easily distinguished from all known species by its densely villoso-tomentose calyx segments and maculate corollas. In all Fortune's specimens the leaves are wanting.

5. *C. Dendrophila*, Seem.; *Tecoma (Campsis) Dendrophila*, Blume, Rumph. p. 36. t. 190; foliis 3-foliolatis, foliolis elliptico-oblongis ovatis vel acuminatis apice subserratis glabris; racemis axillaribus solitariis; tubo corollæ calyce duplo longiore.—*Dendrophila trifoliata* et *Bignonia rhodosantha*, Herb. Zipp.—Geogr. Distr. Woods, on the coast of New Naima.

"Frutex alte scandens, radicans. Caulis teres, varie tortus, sulcatus, cinereo-

fuscus; ramuli teretes, striati, glabriusculi. Petioli semiteretes, angustissime marginati.—Calyx campanulatus, subquinquegonus, semiquinquefidus; laciniis ovatis, acutis, arrectis, æqualibus, subcarinatis, ad margines albidos extenuatos sericeo-tomentosis. Corolla infundibuliformis, extus phœnicea, intus lactea, tota præter tubum intus circa insertionem staminum glabra; tubo elongato, calyce fere triplo longiore, subcurvo, intus supra basin nonnihil villoso; limbo inæquali 5-lobo, patente, lobis ovatis obtusiusculis. Stamina inclusa. Filamenta ad basin villosiuscula, superne glabra. Antheræ glabræ. Pollen ellipsoideum, tricoccum. Pistillum imo annulo crenulato cinctum. Ovarium pseudo-biloculare, dissepimentis carnosis utrinque subarcuato-incurvis et ad margines illorum ovulis rubris horizontalibus anatropis obsessis. Stylus filiformis, tubum corollæ longitudine fere adæquans. Stigma bilamellatum, lamellis ovato-lanceolatis, intus planis, dorso gibbis."—Blume, l. c.

6. *C. Amboinensis*, Seem.; *Tecoma (Campsis) Amboinensis*, Blume, Rumph. l. c.; foliis imparipinnatis rarissime trifoliolatis, foliolis paucijugis ellipticis acuminatis subrepandis subtus puberulis; racemis lateralibus solitariis geminisve; tubo corollæ calyce vix longiore.—Geogr. Distr. Amboina, in woods.

"Caulis teres, ramulis glabris. Foliola (3–3½ poll., 1⅓–1¼ poll. lata) supra glaberrima, subtus puberula. Bracteæ 2 lin. longæ, lineares, acuminatæ, puberulæ, deciduæ. Calyx campanulatus, 5-fidus, crassus, rubicundus, glaber; laciniis æqualibus, arrectis, lanceolatis, aristatis, in marginibus incrassatis superne scabridis. Corolla plus 3½ poll. longa, lato-infundibuliformis, rubro-coccinea, tubo brevi in limbum erectum 5-fidum ampliato, extus glabro, intus supra basin stupposo, limbi laciniis triangulari-ovatis, acutiusculis, inæqualibus, ad margines subpubescentibus. Ovarium cylindricum, disco carnoso cinctum. Stigma spathulatum, bilobum."—Blume, l. c.

Astianthus, D. Don in Edinb. Phil. Journ. ix. p. 262. Char. gen. emend.: Calyx tubulosus, ecostatus, limbo 5-dentato æquali. Corolla infundibuliformis, basi tubulosa, limbo 2-labiato, labio inf. 3-, sup. 2-lobo. Stamina 4, didynama, cum rudimento quinti. Antheræ parallelæ, nudæ. Stigma 2-lobum. Capsula siliquosa, echinulata, 2-locularis, marginicida, septo crasso spongioso valvis contrario. Semina in quavis septi fascie pluriseriata, minuta, compressa, alata, ala completa subovali, corpore cordato.—Arbor 30-ped. Mexicana et Amer. centr., habitu Salicis; ramis glabris; foliis ternis vel superioribus sparsis, elongato-linearibus, integerrimis, coriaceis (8–14 poll. long., 2–3 lin. lat.); racemis terminalibus sæpe dichotome paniculatis, floribus flavis. —D. Don in Edinb. Phil. Journ. ix. p. 262 (1823); G. Don, Gen. Syst. iv. p. 228; De Cand. Prodr. ix. p. 177.

Species unica: *Astianthus longifolius*, D. Don in Edinb. Phil. Journ.

ix. p. 262 (1823); G. Don, Gen. Syst. p. 228; De Cand. Prod. ix. p. 177; 'Bonplandia,' x. p. 221, t. 13.—*Bignonia viminalis*, Kunth in Humb. et Bonpl. Nov. Gen. Amer. iii. p. 132; De Cand. Prod. ix. p. 144. *Tecoma saligna*, Lindl. Herb. Nomen vernac. Mexicanum, "Aguejote," teste Gregg. —Geogr. Distr. On the slopes of the mountains of Western Mexico, between Mescala and Estola (Humboldt and Bonpland! in Herb. Berol.); between Vera Cruz and Oaxaca (Galeotti! n. 1017), near Jalapa (Galeotti! n. 20); at Aguacatlan, near Tepic (Gregg! n. 946); in Guatemala (Skinner! in Herb. Lindl. et Hook.); Nicaragua (Seemann!), always growing on the banks of rivers, and replacing our Willows in those regions.

In Lindley's herbarium there are specimens of *Astianthus* collected by Skinner in Guatemala, the value of which consists in their having both flowers and ripe fruit. The position of the genus, so long doubtful, is by means of these easily cleared up. Instead of belonging to the *Eubignonieæ*, *Astianthus* must be placed near *Dolichandrone*, amongst *Jacarandeæ*. It has nothing to do with *Catalpa*, as was supposed, neither agreeing with it in fruit nor flower, and four of the stamens being fertile. The seeds are not, as D. Don had described them, "villis numerosis papposa." Don described the seeds of another *Bignoniacea* as belonging to *Astianthus*. Don and De Candolle describe the flowers of *Astianthus* as "rubro-purpurea;" but all of us who have seen the plant wild, as yellow.

I have identified *Bignonia viminalis* of Kunth with *Astianthus longifolius*; the authentic specimens of Humboldt and Bonpland leave no doubt on that point. The genus consists only of one species, and differs from its allies in its spiny fruit, regular calyx, and parallel anthers. Its seeds are the smallest of any *Bignoniacea* known to me.

ON A NEW SPECIES OF AMMANNIA GROWING WILD IN THE BOTANICAL GARDENS, CALCUTTA.

By S. Kurz, Esq.

The Botanical Gardens at Calcutta have already yielded me last year a new species of *Lemna*. This year I was so fortunate as to detect another new and marked species. This, however, is not the only find in the gardens during 1867, for I shall soon have the pleasure of sub-

mitting the description of an undoubted hybrid between *Blumea bifolia* and *B. lacera*, growing wild in the pasture-like plantations.

The new species, of which I now give a description, has long deceived me, as I looked upon it as some seedling; but during this rainy season I picked up some specimens of it rather for curiosity's sake than for closer examination, when, to my surprise, I found that my supposed seedlings were perfect plants in flower and fruit.

I describe this new species as an *Ammannia* because I consider *Rotala*, *Ameletia*, *Diplostemon*, *Ditheca*, *Hapalocarpum*, *Tritheca*, *Mirkooa*, and *Nesæa* not to be distinct generically. According to its habit it ought to be placed in *Rotala*, but it differs by the absence of petals.

Ammannia (Rotala?) pygmæa, Kurz; pygmæa, procumbens; folia solitaria, opposita, linearia; flores solitarii, axillares, petalis carentes; calyx 4-lobatus; stamina numero variantia, frequentius 2; capsula apice tuberculata.

Herbulæ pygmææ, procumbentes, glaberrimæ, colore olivaceo gaudentes, paullo succulentæ, ramis vix pollicem sæpius autem 3–6 lin. tantum longis obsolete 4-angularibus canaliculatis, ad nodos sæpius purpurascentibus. Radices crassissimæ, breves, oculo nudo quasi succisas esse apparentes, ex axillis infimis foliorum solitariæ erumpentes. Folia opposita, solitaria, decussata, circiter 2–3 lin. longa, linearia, in petiolum brevem indistincte attenuata, obtusiuscule acuminata, deflexa, nervo unico rubescente subtus prominente percursa. Alabastra tetragona. Flores minutissimi, $\frac{1}{4}$–$\frac{3}{4}$ lin. tantum longi, solitarii, axillares, sessiles, bracteolis 2 calycis longitudine subulatis reflexis coccineis sustenti. Calyx campanulatus, 4-lobatus, lobis patulis triangularibus acutis. Dentium interjectorum et petalorum vestigia nulla. Stamina 2, opposita, rarius 3 v. 4, calycis tubi parti superiori adnata; filamenta brevia, basi latiora. Ovarium inclusum, obovatum, apice minute tuberculatum, 3-loculare, loculis multiovulatis; stylus perbrevis; stigma capitatum. Capsula calyce paullo longior, obovoidea, apice tuberculata, coccinea, trivalvis, septicide dehiscens, dissepimentorum obliteratione uniloculаris, polysperma. Semina fabæformes, majuscula, lævissima.

This dwarf species grows on bricklaid roads before the superintendent's house, and near Kyd's monument. It flowers during the rainy season, especially in August, when it ripens also its fruits.

The number of the stamens is very variable. Most flowers examined

were diandrous, but several had three, and a few even four stamens. I fancy I have seen one flower with a 5-cleft calyx, but from the minuteness of the same it was blown away before I could ascertain this point satisfactorily.

Botanic Garden, Calcutta, September.

PROPAGATION OF RUBI.

I learn from one of our most distinguished botanists that the curious mode in which some brambles root at the end of their surculi in the autumn, is not generally, if at all, known to botanists. It may therefore be well to describe it very shortly, especially as my work on the British *Rubi* is unavoidably delayed for some time longer.

It is known to every one that the European fruticose *Rubi* mostly produce long arching shoots in one year, upon which the flowering shoots of the succeeding year grow. It is also well known that these shoots endeavour to reach the ground in autumn, and do so unless prevented by some obstacle. In nearly all cases they arrive there some weeks before their growth is ended, and in some species the arch, if not artificially supported, is very short and low. The surculus on reaching the ground early in the summer, runs along the ground, and often follows all its inequalities until the autumn. It then raises its end, and forms a very small but decided arch, so as to present its point vertically to the earth, into which it enters for an inch or more. The part, thus naturally buried, then becomes thick and fleshy, and emits roots. During the winter the living connection between the old root and the rooted fleshy end of the stem ceases, by the death of the younger part of the surculus. In the next spring, surculi rise from this new and now independent rootstock, similar to those from the parent root.

The peculiarity is, that the stem forms a large arch at its base, then runs along the ground, and ends in a small arch, for the purpose of presenting its end in a direct way to the ground, so that its point may penetrate it and be enabled to take root.—C. C. BABINGTON.

BOTANICAL NEWS.

In a paper read at the Geographical Society on Explorations in Central America, Mr. John Collinson, C.E., states that amongst the curious causes which affected the compass when cutting his way through the primeval forests of Nicaragua, were "some of the enormous Mahogany and Wild Cotton (*Eriodendron*) trees, which would often attract it as much as three degrees, observations of the Pole Star and Southern Cross attesting the truth of the theodolite lines, and confirming the occurrence of the phenomenon." If this statement should be borne out by future investigations, Mr. Collinson will have made a valuable discovery, for we do not find even a hint on the subject in writings where we expected to find it,—on trees struck by lightning. With regard to the latter subject, it would be desirable to collect more data than we at present possess. Dr. Buchenau has lately raised the question whether or not certain species of trees, such as the Birch, enjoy an immunity from being struck, or rather say, injured by lightning. No observations seem to be on record of Cocoa-nut Palms being injured by lightning, though, as Tennant, in his well-known work on Ceylon, states, they are known to be excellent lightning conductors.

The first part of volume i. of a new series of Hooker's 'Icones Plantarum; or, Figures, with descriptive characters and remarks, of new or rare plants selected from the Kew Herbarium' (price seven shillings, post free), is now published by Messrs. Williams and Norgate, 14, Henrietta Street, Covent Garden, London, W.C. The numbering of the Plates (which are drawn by Mr. Fitch) is in continuation of the former series, commencing with 1001, and representing the following species:—*Hermas villosa*, Thunb., Cape of Good Hope; *Traversia baccharoides*, Hook. fil., New Zealand; *Haastia pulvinaris*, and *H. Sinclairii*, Hook. fil., New Zealand; *Allanblackia floribunda*, Oliv., Tropical Africa; *Chaunochiton loranthoides*, Benth., Tropical America; *Pleurocarpæa denticulata*, Benth., Australia; *Hydrolythrum Wallichii*, Hook. fil., India; *Alsodeiopsis Mannii*, Oliv., Tropical Africa; *Pachycladon Novæ-Zelandiæ*, Hook. fil., New Zealand; *Anona Mannii*, Oliv., Tropical Africa; *Senecio tropæolifolius*, Macowan, Cape of Good Hope; *Thamnea depressa*, Oliv., Cape of Good Hope; *T. uniflora*, Sol., var. *hirtella*, Cape of Good Hope; *Berzelia (Mniothamnea) callunoides*, Oliv., Cape of Good Hope; *Alsophila Rebeccæ*, F. Muell., Australia; *Schizæa Sprucei*, Hook., Tropical America; *Sindora Wallichii*, Benth., India; *Liquidambar orientalis*, Mill., Levant; *L. Formosana*, Hance, Formosa; *Mellissia begonifolia*, Hook. fil., St. Helena; *Heteroneuron nigricans*, Hook. fil., Amazons; *Kaliphora Madagascariensis*, Hook. fil., Madagascar; *Lamprolobium fruticosum*, Benth., Australia; and *Illipeia cuneifolia*, Hook. fil. et T., India.

Mr. James Britten has published a Catalogue of the Plants known or reported to have been found in the county of Buckingham; and will be happy to forward a copy of it to any person sending name and address, and enclosing a couple of stamps, to the author, at High Wycombe. This preliminary list contains 777 species, and 22 varieties.

On the farm of Charles M. Horton, in Little River District, Wake Co., N. Carolina, there is an apple-tree, says the Philadelphia 'Gardener's Monthly,' which is said to be the largest in the State of North Carolina. "The fruit is most excellent; of the variety here designated 'June Sweeting.' I have had it carefully measured. It is, one foot from the ground, eleven feet in circumference; at the first branch—eight feet from the ground—*nine* feet *nine* inches, and *fifty-seven* feet through. The limbs cover a circle of fifty-seven feet in diameter."

Dr. F. Mueller, of Melbourne, prints in the Proceedings of the Royal Society of Tasmania, a paper on Kippist's genus *Acradenia*, which he transfers from the Boroniaceous tribe of *Rutaceæ* to *Xanthoxyleæ*. The same eminent botanist has also done good service by revising the Epacrideæ, and giving us the result in his invaluable 'Fragmenta.' He relies principally upon the æstivation of the corolla as a primary character for the definition of genera.

At a Congregation, on Thursday, Nov. 14, a grace was offered to the Senate of the University of Cambridge, "authorizing the grant of £300 from the Worts Endowment for Travelling Bachelors to Marmaduke Lawson, B.A., of Trinity, towards defraying his expenses in accompanying the Expedition for the Exploration of Palestine, to collect specimens in the botanical and zoological departments."

In the Proceedings of the Royal Society of Tasmania we find a list of the leafing, flowering, and fruiting of a few standard plants in the Royal Society's Gardens, which shows the bearing of some of our garden plants at the Antipodes:—

December 12th.—Common Privet commencing to flower.
,, 15th.—First bunch of Red Currants ripe.
,, 20th.—First bunch of Black Currants ripe.
,, 25th.—*Melia Azedarach* commencing to flower.
,, 31st.—Doyenne d'été Pear commencing to ripen.
January 10th.—*Veronica angustifolia* in full flower.
,, 11th.—First ripe Apricot gathered (Royal).
,, 18th.—*Grevillea robusta* in full flower.
,, 18th.—First Jargonelle Pears gathered.
,, 25th.—*Catalpa syringifolia* in flower.
,, 30th.—Black Mulberries commencing to ripen.
February 1st.—Peaches commencing to ripen (George IV.).
,, 8th.—Kerry Pippin Apple commencing to ripen.
,, 11th.—Windsor Pear commencing to ripen.
,, 16th.—Bon Chrétien Pear commencing to ripen.
,, 16th.—Greengage Plum commencing to ripen.
,, 26th.—Ash commencing to shed seed.
March 9th.—Tip of Hornbean commencing to turn yellow.
,, 10th.—*Colchicum autumnale* in full flower.
,, 12th.—Coes' Golden-drop Plum commencing to ripen.
,, 14th.—Seckle Pear commencing to ripen.
,, 15th.—Tips of Elm turning yellow.
,, 16th.—Horse-chestnut leaves turning brown.

March 20th.—Oak leaves commencing to fall.
April 3rd.—Chinese Chrysanthemum commencing to flower.
,, 4th.—Elm leaves commencing to fall.
,, 9th.—Coes' fine late Red Plum commencing to ripen.
,, 18th.—Mountain Ash leaves commencing to fall.
,, 25th.—Leaves of Black Mulberry commencing to fall.
,, 30th.—Seeds of *Carpinus Betulus* commencing to fall.
May 10th.—First Medlar ripe.
,, 17th.—*Coronilla glauca* commencing to flower.
,, 25th.—*Ailanthus glandulosa* leaves all shed.
,, 30th.—*Photinia serrulata* commencing to flower.
,, 31st.—*Spiræa prunifolia* commencing to flower.

'The Darwinian Theory of the Transmutation of Species examined by a Graduate of the University of Cambridge,' is the title of an octavo volume of 387 pages of Anti-Darwinian tendency, just published by J. Nisbet and Co.

Mr. Clements R. Markham accompanies the Abyssinian Expedition in the capacity of Geographer and Botanist.

A useful 'Manual of the British Seaweeds,' by S. O. Gray, has just been brought out by Reeve and Co.

Professor Unger has retired from the chair of Botany at the Vienna University.

The second and concluding volume of the 'Miscellaneous Botanical Works of Robert Brown,' edited by J. J. Bennett, Esq., is nearly ready for distribution to the members of the Ray Society, by whom it is published. It contains the Systematic Memoirs of Mr. Brown, and the numerous contributions made by him to systematic works.

Linnean Society of London.—*Nov. 7th.*—G. Bentham, Esq., President, in the chair. Dr. Campbell exhibited a series of Drawings of the Plants of Central India, executed by Mrs. Ashburner. *Nov. 21st.*—G. Bentham, Esq., President, in the chair. Mr. W. H. Spencer was elected a Fellow. Mr. Ward exhibited some dried specimens of British Plants, exhibiting the influence of climate and local conditions in altering their character and appearance. Dr. Braithwaite exhibited two Mosses, new to this country, *Amblystegium confervoides* and *Hypnum Bambergeri*, both discovered by Dr. Fraser, of Wolverhampton. Mr. Hanbury exhibited fresh specimens of the Fruit of *Amomum Clusii*, ripened, as he believed, for the first time in Britain. The following papers were read:—"On the *Fagus castanea* of Loureiro's 'Flora Cochinchinensis'; with descriptions of two new Chinese *Corylaceæ*," by Dr. H. F. Hance; "Note on the *Isoëtes capsularis*, Roxb.," by Mr. J. Scott; "Synopsis of the South African *Restiaceæ*," by Dr. M. T. Masters; "Notes on the Flora of North-East Tasmania," by Mr. W. K. Bissill; "On the Branched Palms in Southern India," by Dr. S. P. Andy; and "Observations on *Thlaspi alpestre*, L.," by Mr. J. Windsor.

Mr. Cutter, of 35, Great Russell Street, has on sale a large collection of Ferns, collected by Moritz in Venezuela, which he is willing to dispose of for £4. The collection contains many duplicates, and might be made into several sets, with a view to resale.

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